



Subaqueous Sanitary Sewer Replacement

Wastewater Collection System Improvements

ENGINEERING REPORT

**Town of Lake Lure
Lake Lure, North Carolina**

**May 2021
LaBella Commission No.: 2200559
SRF No. : CS370489-05**



Engineering Report
for
**Subaqueous Sanitary Sewer Replacement
Wastewater Collection System Improvements
Town of Lake Lure, North Carolina**

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TABLE OF CONTENTS

Section 1.0	Executive Summary	1
1.1	Proposed Project Description.....	1
1.2	Reasons for the Proposed Project	6
1.3	Results of the Alternatives Analysis	6
	1.3.1 Results of the Alternatives Analysis for Phase 1.....	8
	1.3.2 Future Project Phases.....	9
1.4	Summary of the Environmental Impacts and Mitigative Measures	9
1.5	Project Funding and User Fee Increases	13
1.6	Future Project Phase Financing.....	13
Section 2.0	Current Situation	17
2.1	Collection System Rehabilitation.....	17
	2.1.1 Collection System Condition.....	17
	2.1.1.1 Overview of the System	17
	2.1.2 Sewered vs. Unsewered Lots.....	24
	2.1.3 History of Overflows	29
	2.1.4 Collection System Issues	31
	2.1.5 Rehabilitation/Replacement Prioritization	31
	2.1.5.1 Portions of Sanitary Sewer Evaluation Study Completed	32
	2.1.6 Current Population	32
	2.1.7 Current Wastewater Flow	34
2.2	Wastewater Treatment Plant Equipment Repair and Replacement.....	36
	2.2.1 Current WWTP Condition	36
	2.2.2 Wastewater Treatment Plant Treatment Train Condition	38
	2.2.3 Specific Equipment Issues	42
Section 3.0	Future Situation	45
3.1	Population Projections	45
3.2	Flow Projections	47
	3.2.1 Collection System Rehabilitation.....	47
	3.2.2 Wastewater Treatment Plant Equipment Repair and Replacement.....	48
3.3	Future Project Phases	49
3.4	Future Project Phase Financing.....	53
Section 4.0	Purpose and Need	55
4.1	Analysis of the Current and Future Situation.....	55
4.2	Need Statement.....	55
4.3	Purpose Statement	56
4.4	Correlation of the Need to the Purpose.....	56
Section 5.0	Alternatives Analysis	57
5.1	Alternative Descriptions	57
	5.1.1 No-Action Alternative	57
	5.1.2 Subaqueous Sanitary Sewer (SASS) Alternatives.....	59
	5.1.2.1 Backshore Gravity/Lift Stations Alternative (Preferred).....	59
	5.3.2.1.1 Future Project Phases.....	62

5.1.2.2	Backshore Pump Stations Alternative	72
5.1.2.3	Backshore Low Pressure Sewer System Alternative	79
5.1.2.4	Land-Based Low Pressure Sewer System Alternative	81
5.1.3	Wastewater Treatment Plant (Plant) Alternatives	83
5.1.3.1	Sequencing Batch Reactor (SBR) Alternative	84
5.1.3.2	Moving Bed Biological Reactor (MBBR) Alternative	89
5.1.3.3	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred)	93
5.2	Future Project Phases	99
5.3	Alternatives Analysis Summary	99
5.3.1	Results of the Alternatives Analysis for Phase 1	101
5.4	Present Worth Analysis.....	101
5.4.1	No-Action Alternative	101
5.4.2	Subaqueous Sanitary Sewer (SASS) Alternatives.....	102
5.4.2.1	Backshore Gravity/Lift Stations Alternative (Preferred)	102
5.4.2.2	Backshore Pump Stations Alternative	110
5.4.2.3	Backshore Low Pressure Sewer System Alternative.....	118
5.4.2.4	Land-Based Low Pressure Sewer System Alternative	126
5.4.3	Wastewater Treatment Plant (Plant) Alternatives	134
5.4.3.1	Sequencing Batch Reactor (SBR) Alternative	134
5.4.3.2	Moving Bed Biofilm Reactor (MBBR) Alternative.....	142
5.4.3.3	Integrated Fixed-Film Activated Sludge Alternative Preferred)	150
5.4.4	Subaqueous Sanitary Sewer (SASS) and Wastewater Treatment Plant (Plant) Combined Alternatives	158
5.4.4.1	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project)	158
5.4.4.2	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative	168
5.5	Present Worth Analysis for Feasible Alternatives.....	177
5.5.1	Subaqueous Sanitary Sewer (SASS) Alternatives.....	177
5.5.2	Wastewater Treatment Plant (Plant) Alternatives	177
5.5.3	Subaqueous Sanitary Sewer (SASS) and Wastewater Treatment Plant (Plant) Alternatives	178
Section 6.0 Proposed Project Description.....		179
6.1	Backshore Gravity/Lift Station Project.....	180
6.2	Integrated Fixed-Film Activated Sludge (IFAS) Project	180
6.3	Collection System and Treatment Rehabilitation and Replacement Phase 1	181
6.4	Environmental Impacts	182
6.5	Project Costs	184
Section 7.0 Environmental Information Document.....		185
7.1	Topography and Floodplains.....	185
7.2	Soils.....	195
7.3	Prime and Unique Farmland	203
7.4	Land Use	212

7.5	Forest Resources	216
7.6	Wetlands and Streams.....	219
7.7	Water Resources	226
7.8	Wild and Scenic Rivers	232
7.9	Coastal Resources	232
7.10	Shellfish, Fish and Their Habitats.....	233
7.11	Wildlife and Natural Vegetation.....	237
7.12	Public Lands and Scenic, Recreational & State Natural Areas.....	244
7.13	Areas of Archaeological or Historical Value	248
7.14	Air Quality	252
7.15	Noise Levels	254
7.16	Introduction of Toxic Substances	256
7.17	Environmental Justice.....	258
7.18	Mitigative Measures.....	261
Section 8.0 Financial Analysis.....		269
8.1	Determination of Rates to Median Household Income Percentage	269
8.2	Determination of Funding Sources and Loan Repayment	269
8.3	Determination of User Fee Increases	271
8.4	Determination of Impacts to the Utility Bill per the Percent Medium Household Income.....	274
8.5	Future Project Phasing	276
Section 9.0 Public Participation		279
9.1	Level of Public Involvement	279
9.2	Public Meeting Requirements	279

LIST OF APPENDICIES

Appendix A	Submittal Checklist
Appendix B	Collection and Treatment Systems Evaluation Subaqueous Sanitary Sewer Inventory
Appendix C	Sanitary Sewer Overflow (SSO) Information Special Order of Consent (SOC) Application
Appendix D	Metered Flow Data <ul style="list-style-type: none"> • WWTP Flow Data • Rumbling Bald Resort Flow Data • Metered Chimney Rock Flow Data WWTP Average Daily Flows Seasonal Peaking Factor
Appendix E	Notice of Violations (NOVs) Special Order of Consent (SOC) Application NDPES Permit
Appendix F	Sludge Production Ledger
Appendix G	Wastewater Treatment Plant (Plant) Photos
Appendix H	Future Peaking Factor Lake Lure Flow Projections without completion of the proposed project Seasonal Peaking Factor
Appendix I	US Census Data <ul style="list-style-type: none"> • Current Population • Population Projections

Appendix J	Environmental Information Document Supporting Information Comment Letters
Appendix K	Subaqueous Sewer System Design Information
Appendix L	The Draper Plan
Appendix M	Comment Response Tables (2) Letter requesting extension of loan term to 30-years

LIST OF TABLES

Table 2.1	System Overview.....	24
Table 2.2	SSO Description and Special Orders.....	29
Table 2.3	Collection System Issue Description.....	31
Table 2.4.1	Summary of Work Accomplished to Prioritize Collection System Components for Rehabilitation/Replacement.....	32
Table 2.4.2	Priority Evaluation Results for Sewers Needing Rehabilitation/Replacement.....	32
Table 2.5	Current Population Analysis Method 1 - Limited Service Area	34
Table 2.6	Current Flow Analysis.....	35
Table 2.7	General WWTP Condition	36
Table 2.8	Description of Treatment Train	39
Table 2.9.1	Specific Equipment Description (Fine Screen).....	42
Table 2.9.2	Specific Equipment Description (Digester).....	42
Table 2.9.3	Specific Equipment Description (Flash Mix).....	43
Table 2.9.4	Specific Equipment Description (Flocculation Basin)	43
Table 2.9.5	Specific Equipment Description (Sedimentation Basin).....	43
Table 2.9.6	Specific Equipment Description (Secondary Clarifier).....	44
Table 2.9.7	Specific Equipment Description (Chlorine Contact Chamber)	44
Table 2.9.8	Specific Equipment Description (Chemical Feed Pumps)	44
Table 3.1	Future Population Analysis	46
Table 3.2	Future Peak Flow Analysis	48
Table 3.3	Future Flow Analysis	49
Table 3.4	Future Phases	50
Table 5.1.1	Alternatives Description: Alternative I	57
Table 5.1.2	Alternatives Description: Alternative II	60
Table 5.1.3	Alternatives Description: Alternative III	73
Table 5.1.4	Alternatives Description: Alternative IV	80
Table 5.1.5	Alternatives Description: Alternative V	82
Table 5.1.6	Alternatives Description: Alternative VI	85
Table 5.1.7	Alternatives Description: Alternative VII	89
Table 5.1.8	Alternatives Description: Alternative VIII	93
Table 5.2.1	Backshore Gravity/Lift Stations Alternative (Preferred) Capital Costs .	102
Table 5.2.2	Backshore Gravity/Lift Stations Alternative (Preferred) Cost Life Cycle Assumptions	103
Table 5.2.3	Backshore Gravity/Lift Stations Alternative (Preferred) Replacement Costs (Years 1-5).....	104
Table 5.2.4	Backshore Gravity/Lift Stations Alternative (Preferred) Replacement Costs (Years 6-10).....	105
Table 5.2.5	Backshore Gravity/Lift Stations Alternative (Preferred) Replacement Costs (Years 10-15).....	106

Table 5.2.6	Backshore Gravity/Lift Stations Alternative (Preferred) Replacement Costs (Years 16-20).....	107
Table 5.2.7	Backshore Gravity/Lift Stations Alternative (Preferred) Present Value of O&M Costs (Years 1-10)	108
Table 5.2.8	Backshore Gravity/Lift Stations Alternative (Preferred) Present Value of O&M Costs (Years 11-20)	108
Table 5.2.9	Backshore Gravity/Lift Stations Alternative (Preferred) Present Value of Intermittent O&M Costs (Years 1-10)	109
Table 5.2.10	Backshore Gravity/Lift Stations Alternative (Preferred) Present Value of Intermittent O&M Costs (Years 11-20).....	109
Table 5.2.11	Backshore Pump Stations Alternative Capital Costs.....	110
Table 5.2.12	Backshore Pump Stations Alternative Cost Life Cycle Assumptions	111
Table 5.2.13	Backshore Pump Stations Alternative Replacement Costs (Years 1-5)	112
Table 5.2.14	Backshore Pump Stations Alternative Replacement Costs (Years 6-10)	113
Table 5.2.15	Backshore Pump Stations Alternative Replacement Costs (Years 10-15)	114
Table 5.2.16	Backshore Pump Stations Alternative Replacement Costs (Years 16-20)	115
Table 5.2.17	Backshore Pump Stations Alternative Present Value of O&M Costs (Years 1-10)	116
Table 5.2.18	Backshore Pump Stations Alternative Present Value of O&M Costs (Years 11-20)	116
Table 5.2.19	Backshore Pump Stations Alternative Present Value of Intermittent O&M Costs (Years 1-10)	117
Table 5.2.20	Backshore Pump Stations Alternative Present Value of Intermittent O&M Costs (Years 11-20).....	117
Table 5.2.21	Backshore Low Pressure Sewer System Alternative Capital Costs.....	118
Table 5.2.22	Backshore Low Pressure Sewer System Alternative Cost Life Cycle Assumptions	119
Table 5.2.23	Backshore Low Pressure Sewer System Alternative Replacement Costs (Years 1-5)	120
Table 5.2.24	Backshore Low Pressure Sewer System Alternative Replacement Costs (Years 6-10)	121
Table 5.2.25	Backshore Low Pressure Sewer System Alternative Replacement Costs (Years 10-15)	122
Table 5.2.26	Backshore Low Pressure Sewer System Alternative Replacement Costs (Years 16-20)	123
Table 5.2.27	Backshore Low Pressure Sewer System Alternative Present Value of O&M Costs (Years 1-10)	124
Table 5.2.28	Backshore Low Pressure Sewer System Alternative Present Value of O&M Costs (Years 11-20).....	124
Table 5.2.29	Backshore Low Pressure Sewer System Alternative Present Value of Intermittent O&M Costs (Years 1-10)	125
Table 5.2.30	Backshore Low Pressure Sewer System Alternative Present Value of Intermittent O&M Costs (Years 11-20).....	125
Table 5.2.31	Land-Based Low Pressure Sewer System Alternative Capital Costs	126

Table 5.2.32	Land-Based Low Pressure Sewer System Alternative Cost Life Cycle Assumptions	127
Table 5.2.33	Land-Based Low Pressure Sewer System Alternative Replacement Costs (Years 1-5)	128
Table 5.2.34	Land-Based Low Pressure Sewer System Alternative Replacement Costs (Years 6-10)	129
Table 5.2.35	Land-Based Low Pressure Sewer System Alternative Replacement Costs (Years 10-15)	130
Table 5.2.36	Land-Based Low Pressure Sewer System Alternative Replacement Costs (Years 16-20)	131
Table 5.2.37	Land-Based Low Pressure Sewer System Alternative Present Value of O&M Costs (Years 1-10)	132
Table 5.2.38	Land-Based Low Pressure Sewer System Alternative Present Value of O&M Costs (Years 11-20).....	132
Table 5.2.39	Land-Based Low Pressure Sewer System Alternative Present Value of Intermittent O&M Costs (Years 1-10)	133
Table 5.2.40	Land-Based Low Pressure Sewer System Alternative Present Value of Intermittent O&M Costs (Years 11-20).....	133
Table 5.2.41	Sequencing Batch Reactor (SBR) Alternative Capital Costs	134
Table 5.2.42	Sequencing Batch Reactor (SBR) Alternative Cost Life Cycle Assumptions.....	135
Table 5.2.43	Sequencing Batch Reactor (SBR) Alternative Replacement Costs (Years 1-5)	136
Table 5.2.44	Sequencing Batch Reactor (SBR) Alternative Replacement Costs (Years 6-10)	137
Table 5.2.45	Sequencing Batch Reactor (SBR) Alternative Replacement Costs (Years 10-15)	138
Table 5.2.46	Sequencing Batch Reactor (SBR) Alternative Replacement Costs (Years 16-20)	139
Table 5.2.47	Sequencing Batch Reactor (SBR) Alternative Present Value of O&M Costs (Years 1-10)	140
Table 5.2.48	Sequencing Batch Reactor (SBR) Alternative Present Value of O&M Costs (Years 11-20)	140
Table 5.2.49	Sequencing Batch Reactor (SBR) Alternative Present Value of Intermittent O&M Costs (Years 1-10)	141
Table 5.2.50	Sequencing Batch Reactor (SBR) Alternative Present Value of Intermittent O&M Costs (Years 11-20).....	141
Table 5.2.51	Moving Bed Biofilm Reactor (MBBR) Alternative Capital Costs	142
Table 5.2.52	Moving Bed Biofilm Reactor (MBBR) Alternative Cost Life Cycle Assumptions.....	143
Table 5.2.53	Moving Bed Biofilm Reactor (MBBR) Alternative Replacement Costs (Years 1-5)	144
Table 5.2.54	Moving Bed Biofilm Reactor (MBBR) Alternative Replacement Costs (Years 6-10)	145
Table 5.2.55	Moving Bed Biofilm Reactor (MBBR) Alternative Replacement Costs (Years 10-15)	146
Table 5.2.56	Moving Bed Biofilm Reactor (MBBR) Alternative Replacement Costs (Years 16-20)	147
Table 5.2.57	Moving Bed Biofilm Reactor (MBBR) Alternative Present Value of O&M Costs (Years 1-10)	148

Table 5.2.58	Moving Bed Biofilm Reactor (MBBR) Alternative Present Value of O&M Costs (Years 11-20)	148
Table 5.2.59	Moving Bed Biofilm Reactor (MBBR) Alternative Present Value of Intermittent O&M Costs (Years 1-10)	149
Table 5.2.60	Moving Bed Biofilm Reactor (MBBR) Alternative Present Value of Intermittent O&M Costs (Years 11-20).....	149
Table 5.2.61	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Capital Costs	150
Table 5.2.62	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Cost Life Cycle Assumptions	151
Table 5.2.63	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Replacement Costs (Years 1-5).....	152
Table 5.2.64	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Replacement Costs (Years 6-10).....	153
Table 5.2.65	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Replacement Costs (Years 10-15).....	154
Table 5.2.66	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Replacement Costs (Years 16-20).....	155
Table 5.2.67	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Present Value of O&M Costs (Years 1-10)	156
Table 5.2.68	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Present Value of O&M Costs (Years 11-20)	156
Table 5.2.69	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Present Value of Intermittent O&M Costs (Years 1-10)	157
Table 5.2.70	Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred) Present Value of Intermittent O&M Costs (Years 11-20)...	157
Table 5.2.71	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Capital Costs	159
Table 5.2.72	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Cost Life Cycle Assumptions	160
Table 5.2.73	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Replacement Costs (Years 1-5).....	162
Table 5.2.74	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Replacement Costs (Years 6-10).....	163
Table 5.2.75	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Replacement Costs (Years 10-15).....	164
Table 5.2.76	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Replacement Costs (Years 16-20).....	165
Table 5.2.77	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Present Value of O&M Costs (Years 1-10)	166
Table 5.2.78	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Present Value of O&M Costs (Years 11-20)	166
Table 5.2.79	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Present Value of Intermittent O&M Costs (Years 1-10)	167
Table 5.2.80	Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) Present Value of Intermittent O&M Costs (Years 11-20)	167

Table 5.2.81	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Capital Costs	169
Table 5.2.82	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Cost Life Cycle Assumptions.....	170
Table 5.2.83	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Replacement Costs (Years 1-5)	171
Table 5.2.84	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Replacement Costs (Years 6-10)	172
Table 5.2.85	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Replacement Costs (Years 10-15)	173
Table 5.2.86	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Replacement Costs (Years 16-20)	174
Table 5.2.87	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Present Value of O&M Costs (Years 1-10).....	175
Table 5.2.88	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Present Value of O&M Costs (Years 11-20).....	175
Table 5.2.89	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Present Value of Intermittent O&M Costs (Years 1-10)	176
Table 5.2.90	Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative Present Value of Intermittent O&M Costs (Years 11-20)	176
Table 5.2.91	Total Present Worth for Feasible SASS Alternatives	177
Table 5.2.92	Total Present Worth for Feasible Plant Alternatives.....	177
Table 5.2.93	Total Present Worth for Feasible SSAS and Plant Alternatives.....	178
Table 7.1	Mitigative Measures.....	261
Table 8.1	Applicant's/LGU's Financial Condition	269
Table 8.2	Funding Distribution (30-year)	270
Table 8.2A	Funding Distribution (20-year)	270
Table 8.3	Year 1 Interest and Repayment (30-year).....	271
Table 8.3A	Year 1 Interest and Repayment (20-year).....	271
Table 8.4	User Fee Increase Due to Project (30-year)	272
Table 8.4A	User Fee Increase Due to Project (20-year)	272
Table 8.5	Impacts to User Rates (30-year).....	273
Table 8.5A	Impacts to User Rates (20-year).....	274
Table 8.6	Impacts to Bills Due to Project (30-year)	275
Table 8.6A	Impacts to Bills Due to Project (20-year)	276

LIST OF FIGURES

Figure 1.1	Project Vicinity Map.....	4
Figure 1.2	Project Location Map	5
Figure 2.1	System Overview Vicinity Map	22
Figure 2.2	System Overview Location Map	23
Figure 2.3	Sewered Versus Unsewered Lots Map	25
Figure 2.3A	Sewered Versus Unsewered Lots – Phase 1 Map.....	27
Figure 2.4	Project Area SSO Map.....	30
Figure 2.5	WWTP Flow Diagram.....	40
Figure 2.6	Influent Pump Station Map	41

Figure 3.1	Proposed Project Phase Map.....	51
Figure 5.1	Backshore Sewer System Manholes.....	63
Figure 5.2	Backshore Gravity/Lift Station Simplex Station (Submersible Option)	65
Figure 5.3	Preferred Alternative Route.....	67
Figure 5.3A	Dam Penetration Diagram.....	69
Figure 5.3B	Manhole Rehabilitation.....	71
Figure 5.4	Backshore Pump Stations Option.....	77
Figure 5.5	Proposed SBR Layout.....	87
Figure 5.6	Proposed MBBR Layout.....	91
Figure 5.7	Proposed IFAS Layout	95
Figure 5.7A	IFAS Phase 1 Layout	97
Figure 7.1	USGS Topographic Map	189
Figure 7.2	FEMA Flood Insurance Rate Map	190
Figure 7.3	USDA Soil Survey Map	199
Figure 7.4	USDA Farmland Classification Map	206
Figure 7.5	Land Use/Zoning Map.....	215
Figure 7.6	Wetlands Map.....	224
Figure 7.7	Stream Crossings Map.....	225
Figure 7.8	Impaired Streams Map.....	231
Figure 7.9	Natural Areas Map.....	247
Figure 7.10	Historical/Archaeological Value Map.....	251
Figure 7.11	Environmental Justice: Project Area Minority Map	259
Figure 7.12	Environmental Justice: Project Area Low Income Map	260

Section 1.0 Executive Summary

1.1 Proposed Project Description

The proposed project is the construction of a new sanitary collection system, a wastewater treatment plant rehabilitation, and sewer access valve installed in the dam. The project is located in the Mountains Region of North Carolina, in the Town of Lake Lure in Rutherford County. Figures 1.1 and 1.2 show the location of the project.

The Town of Lake Lure (Town) was incorporated in 1927 and today encompasses 13.8 square miles. The lake for which the Town is named is just over 800 acres. The lake was created by a hydroelectric dam, completed in 1927 which began producing power the following year. The Town acquired the lake in 1965 and currently maintains the lake, hydroelectric dam, and typical municipal infrastructure. The Town has several private collections systems that discharge into the their sanitary sewer collection and conveyance system, or Subaqueous Sewer System (SASS), including the Rutherford County system that serves Chimney Rock Village, Rumbling Bald Resort, Blue Heron Point, and Firefly Cove. Along with the SASS, the Town owns and operates a 0.995 million gallons per day (MGD) Wastewater Treatment Plant (Plant) and a Triplex Pump Station (PS).

The entire collection system collects wastewater from approximately 1,032 service connections that serve a population of approximately 1,150. In 2019, the SASS and Wastewater Treatment Plant conveyed and treated approximately 0.5355 MGD on a daily average basis.

The Subaqueous Sewer System (SASS) was originally constructed simultaneously with the hydroelectric dam. It consisted of approximately fourteen (14) miles of cast iron gravity sewer. The sewer lines were installed on concrete collars and on wooden cribbing. The cast iron pipe ranges in size from 8-inches to 20-inches. The flow enters the system through 65 manholes that are located along and/or within the lake perimeter. From these manholes, laterals run to the main line that was installed to the north of the pre-lake Broad River bed. The laterals range in diameter from 8-inches to 12-inches. The main interceptor sanitary sewer line consists of 10-inch diameter to 18-inch diameter cast iron pipe. The age of the components in the system range from 51 years old to 93 years old. The most recent upgrade to the SASS is the installation of a shut off valve behind the dam. This valve would shut off the pipe flow in the event of a catastrophic pipe failure in the lake.

The SASS is currently considered “noncompliant” by the NCDEQ, due to the excessive inflow and infiltration and the risk of catastrophic failure.

The Plant was originally constructed as a 0.350 MGD activated sludge plant in 1969. Prior to this, the wastewater was discharged directly into the Broad River. In 1991, the Plant was renovated and converted into a physical-chemical process (P/C) and was permitted for an annual average daily flow rate of 0.995 MGD. The lake infiltration and inflow (I&I) and infiltration from the connecting land-based collection systems causes issues with the Plant meeting the NPDES permit limits. The plant is currently considered “noncompliant” by NCDEQ, with the most frequently cited NOV’s being in regards to total suspended solids, ammonia, and flow.

The Pump Station (PS) was originally constructed within the dam during the 1969 construction of the Plant, and served as its influent pumping station. In 2000, the PS was moved from within the dam to its current location. The PS has three pumps, however, due to the elevation of the Plant infrastructure, running all three pumps will cause an SSO at the Plant. Each pump is driven by a 15 horsepower motor and is rated at 459 GPM. The influent pump station has a capacity of 915 gallons per minute (gpm).

There are three (3) types of infiltration and Inflow (I&I) that occurs within the project sewershed. The first type of I&I is through land based and connecting collection systems. The second type of I&I is high level lake infiltration. The third type of I&I is through low level infiltration, which enters the pipe through the deeper laterals and the main sanitary sewer interceptor. The combination of lake infiltration in conjunction with the I&I of the connecting land based systems leads to the overwhelming of the headworks pumping station at the Plant and SSOs.

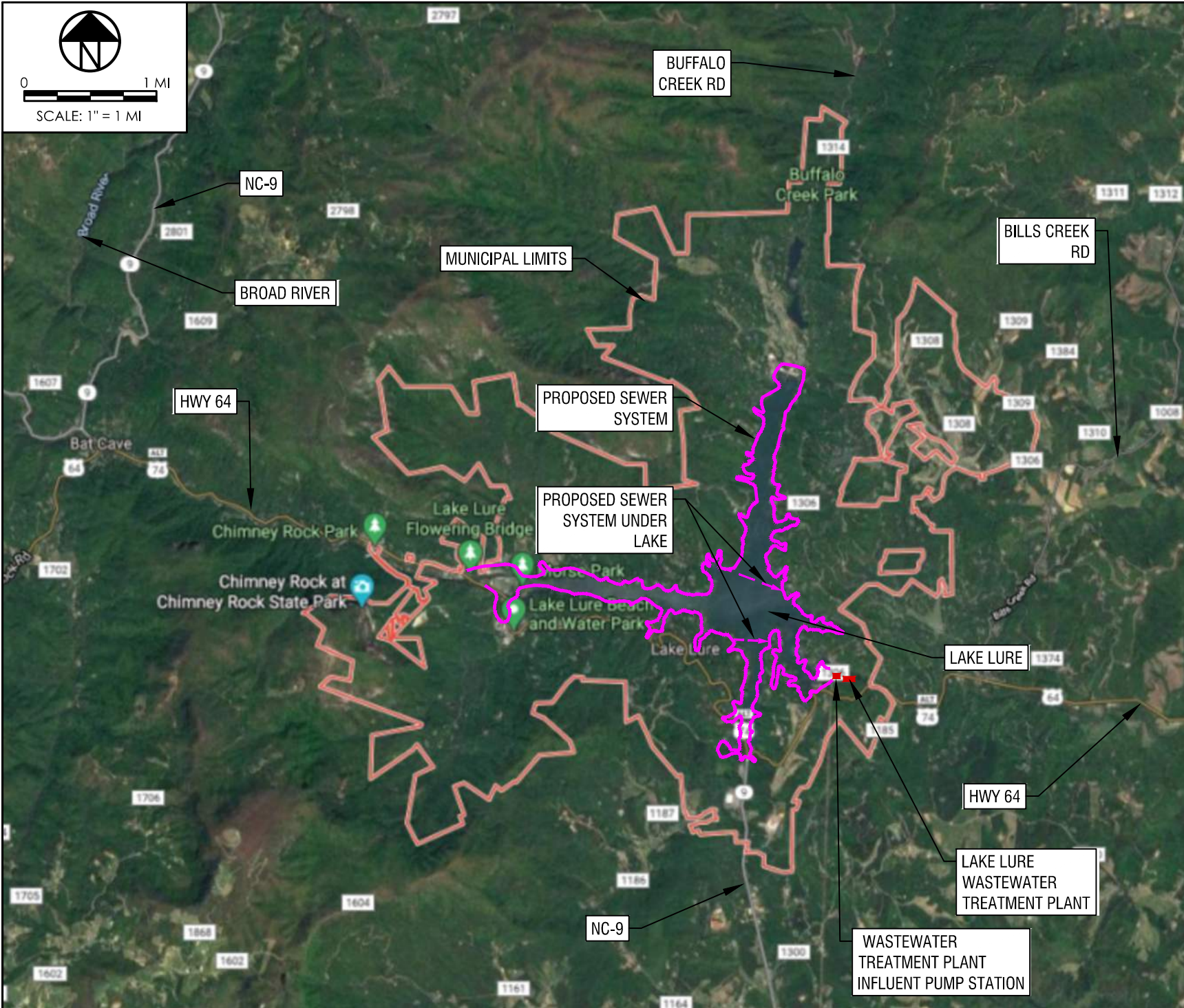
Due to the magnitude of the issues, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. The short-term solution is the current SOC application. During the time period of the SOC, the Town is intending to execute mid-term and long-term improvements.

To provide a construction area for the proposed improvements associated with Phase 1 of the overall project, dewatering of the construction area and a penetration of the dam in the form of a sewer access valve will be installed at the base of the dam to allow the lake

to be lowered an additional 8-feet in addition to the current 12-feet that can be achieved through the tainter gates.

Improvements to the Subaqueous Sewer System (SASS) included as part of Phase 1 involves collecting all existing flows via a network of gravity-flowing sewers that parallel the lake shore line. These sewers include HDPE manholes and HDPE pipe, all designed for 100% long-term elimination of infiltration. The proposed project begins at the lake's dam and runs along the north shoreline for approximately 8,500 linear feet and the south shoreline for approximately 7,000 linear feet. Service laterals will be installed from the main (via an HDPE fusion process to preclude infiltration) to every other adjacent property line, from which the parcels on either side will be served.

Improvements to the Wastewater Treatment Plant (the Plant) included as part of the proposed project involves the correction of the fine screen installation, the installation of a grit removal system, and the replacement of the existing digester with a new one of the same size. The capacity of the existing 0.995 MGD plant will not be increased and will remain a 0.995 MDG plant.



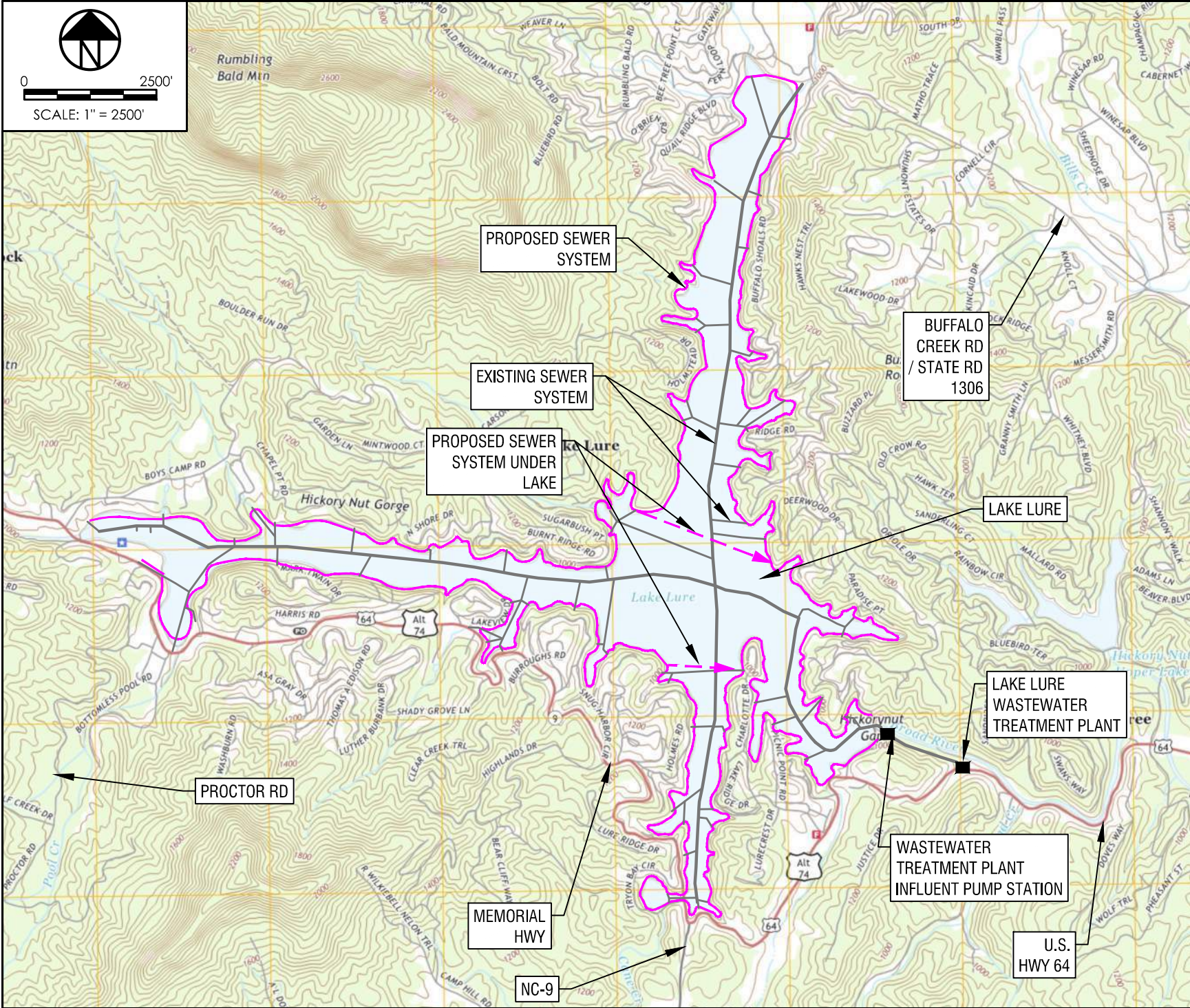
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Figure 1.1

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Project Vicinity Map
Lake Lure Sewer System
 Lake Lure, North Carolina





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Figure 1.2

September 2020

Project Location Map
 Lake Lure Sewer System
 Lake Lure, North Carolina

1.2 Reasons for the Proposed Project

The Subaqueous Sewer System (SASS) was originally equipped with flushing valves that allow lake water into the system. The SASS was designed to have infiltration, however this infiltration is what causes the notice of violations (NOVs) and sanitary sewer overflows (SSOs) today. In 2009, a joint wrap project was undertaken which led to a noticeable reduction in the lake inflow. The joint wrap used has a service life of 15 years, and is approaching the end of its service life. From the available data, the lake inflow is beginning to increase as the pipe wrap and CI pipe age and degrade. The SASS also receives inflow and infiltration from outside users that maintain independent collection systems. This is particularly true of the county system serving Chimney Rock Village, which experiences high peaking factors of 9.11. The combination of lake infiltration in conjunction with the I&I of the connecting land based systems leads to the overwhelming of the headworks pumping station at the Plant and SSOs. Typical sewer systems can be cost-effectively rehabilitated to significantly reduce or eliminate inflow and infiltration. However, the inaccessibility of the SASS makes its replacement or rehabilitation infeasible or prohibitively expensive. In short, there is little the Town can do through typical operations and maintenance to reduce the flows that produce SSOs in the system and NOVs due to the dilution of the wastewater.

Risk is generally defined as the combination of the probability of failure and the consequence of failure. As the probability of failure increases the remaining service life of an asset decreases. The consequence of failure relates to the impact a failure would have. For the Town, the severity of the financial, environmental, and social impact of a catastrophic failure cannot be overstated. The main problem with the Town of Lake Lure's wastewater system is that the lake infiltration from the submerged sewer collection dilutes the wastewater and prevents NPDES compliance. The original design intent in the 1920s was to utilize lake water to flush the system and then discharge everything downstream without treatment. Today the standards for handling wastewater have changed significantly and 100% of that which is in the collection and conveyance system must be treated with no exception.

1.3 Results of the Alternatives Analysis

Five (5) alternatives for the Subaqueous Sewer System (SASS) replacement were considered and four (4) alternatives for the wastewater treatment plant alternative were

considered. Following the selection of the recommended alternative from each category were combined into one project, and then the first phase of the project was pulled out based on the immediate needs and available funding. The installation of a sewer access valve is proposed for and included with all alternatives except the No-Action Alternative.

The Subaqueous Sewer System (SASS) Replacement Alternatives looked at and evaluated were:

- No-Action
- Backshore Gravity/Lift Station (Preferred)
- Backshore Pump Stations
- Backshore Low Pressure Sewer System
- Land-based Low Pressure Sewer System

The No-Action alternative is infeasible due to the risk associated with the continued reliance on the SASS and the continued increase in SSOs that will result from the deterioration of the SASS and continued NOV as a result of the lake infiltration. Ultimately, the SASS will fail with catastrophic environmental, social, and economic impacts. All of the backshore approaches utilize a sewer access valve that would be installed in the dam to increase the available construction area, dewater the construction area, and provide for a dam penetration of the proposed systems.

The Backshore Gravity/Lift Station Alternative (Preferred) is the preferred alternative due to the lowest economic and environmental impact. This alternative replaces the SASS and has the least reliance on pump stations. It has the lowest capital and O&M cost and as a result the lowest total present worth. The operation of the alternative also has inherent SSO protection through the utilization of a gravity backup in the pump station, which not only protects the environment from SSOs, but also improves the O&M of the system.

The Backshore Pump Station Alternative is rejected because of a slightly higher cost and environmental impact due to an increase in the number of pump stations and a greater O&M effort over the preferred alternative.

The Backshore Low Pressure Sewer System Alternative is rejected despite having a similar capital cost because of the significantly higher O&M cost due to the enormous increase in pump stations. This reliance on pump stations adds significantly to its social and environmental impact.

The Land-based Low Pressure Sewer Alternative is rejected due the highest capital cost, O&M cost, and total present worth. This alternative also has the highest social and economic cost.

The Wastewater Treatment Plant (Plant) Alternatives looked at and evaluated were:

- No-Action
- Sequencing Batch Reactor (SBR)
- Moving Bed Biological Reactor (MBBR)
- Integrated Fixed-film Activated Sludge (IFAS) (Preferred)

The No-Action Alternative is infeasible due to the current treatment processes inability to meet the NPDES limits. The Plant will not be able to meet its NPDES limits until it is converted back to a biological process, and this will not be possible until the lake infiltration is removed through the replacement of the SASS. All of the Plant rehabilitation alternatives have similar results in terms of removal efficiencies, however there are differences in cost and O&M that are used to differentiate the alternatives and make a recommendation.

The SBR Alternative is rejected due to the highest total present worth, the need to utilize a temporary treatment plant, and lower redundancy offered by the other alternatives.

The MBBR Alternative is rejected despite having only a slightly higher total present worth. The MBBR offers the same redundancy and footprint as the selected alternatives, but the MBBR requires more difficult O&M related to the capture of the free floating media and maintenance of fixed diffusers.

The IFAS Alternative (Preferred) is the preferred alternate due to the lowest total present worth, small foot print, redundancy, and modular submerged fixed film that ease the O&M of the media and diffusers.

1.3.1 Results of the Alternatives Analysis for Phase 1

The results of the alternatives analysis is to combine the Gravity/Lift Station Alternative (Preferred) with the IFAS Alternative (Preferred) as a solution for the SASS Replacement and Plant Rehabilitation. Due to size, scope, and cost the combined alternatives, this project will be phased based on the immediate needs and \$12.5M in available funding. The Phase 1 project would include the sewer access valve, partial replacement of the

SASS, manhole rehabilitation, correcting of the fine screen, a grit removal system, and digester.

1.3.2 Future Project Phases

As mentioned in Sections 1.1 and 1.3.1, due to the magnitude of the issues with the existing wastewater collection system, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. It is proposed the overall project be completed in six (6) phases. Phase 1 involves construction of some of the gravity lift sewer system, manhole rehabilitation, and work to rehabilitated portions of the Plant and is anticipated to be completed by April 2024. Phases 2 through 5 involve the construction of the rest of the gravity lift sewer system. Each phase is anticipated to take 2 years to complete with Phase 5 ending by April 2032. With the completion of Phase 5 in 2032, all of the existing SASS will have been replaced. Phase 6 involves the complete IFAS conversion of the Plant and is anticipated to be completed in April 2034.

This Engineering Report/Environmental Information Document (ER/EID) describes the proposed construction associated with Phase 1 only. If sources used to fund Phases 2 through 6 require an ER/EID, one will be written for each future phase. All future phases will require additional environmental review prior to construction regardless of the funding source requirements.

1.4 Summary of the Environmental Impacts and Mitigative Measures

Secondary and cumulative impacts of the project will be positive. The Backshore Gravity/Lift Station Alternative would be constructed within the confines of the lake by lowering the water level using the existing tainter gates and the sewer access valve. As such, land disturbance outside of the lake would be minimal. Long-term, this alternative is judged to have the greatest potential for reducing environmental risks associated with sewerage the properties adjacent to the lakeshore. This alternative serves these properties by gravity, eliminating the risks of failure of the hundreds of pump stations that would otherwise be required downslope of each home towards the lakeshore and eliminates the existing aged subaqueous manholes and sewers that currently carry significant failure risk. The Backshore Gravity/Lift Stations Alternative has the further benefit of conveying those sewage flows largely by means of gravity, and minimizing the number of potential failure

points. Even a pump failure would not result in an overflow, as the gravity-carrying capacity of the daisy-chained system would allow bypass of any particular pump station (only the simultaneous failure of two consecutive pump stations would be expected to potentially result in an overflow).

In order to construct this alternatives, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the sewer installation. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. It is the construction of lateral sub-outs that may have a minor direct impacts to the environment with the lateral stub-outs impacting an area of approximately 5' x 5' each.

The installation of the Sewer Access Valve (SAV) will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area. The location of this construction will not directly impact the environment.

The work to be completed at the Wastewater Treatment Plant (Plant) will be done within the existing Plant footprint. The environmental impact of the Integrated Fixed-Film Activated Sludge Alternative, would be limited to the existing wastewater plant site and the adjacent access road. The impacts would primarily be the risk from runoff during rain events that is typical with structure demolition and construction.

FEMA floodplains and floodways will not be impacted by construction of this project.

Topographic, Soil, Prime and Unique Farmland, and Forest Resources impacts will occur during construction, but will be localized within small easements for lateral stub-outs and limited to construction only. The finished sewer line will be buried below tith depth. Pre-construction contours will be restored. Disturbed areas will be promptly reseeded and vegetatively stabilized, if location allow. No burning of removed forest resources will occur. Erosion and sedimentation controls will be installed prior to the beginning of construction and include sediment fencing.

The construction will occur along the backshore area of Lake Lure, there will be no disturbance of wetlands and no crossings of creeks/stream/rivers. There will be two (2) crossings of Lake Lure by the horizontal directional drill (HDD) method which will not impact the lake. The work at the Plant will not disturb any wetlands or creeks/stream/rivers

Water quality impacts will be minimal. Contractors will be instructed to perform all vehicle maintenance activities away from surface waters.

Temporary disturbance to aquatic habitats could affect the behavior of or directly harm some aquatic species with less mobility. The re-establishment of natural stream bed elevations would allow recovery of habitat and species in the streams.

The movement of construction equipment could involve clearing of vegetation, which could temporarily disturb wildlife behavior. These disturbed access areas would likely be narrow enough not to present a break in habitat and therefore is not expected to change wildlife movement.

No wild and scenic rivers, coastal resources, or public lands and scenic and recreational areas are located along the project alignment.

There are 13 state natural areas located within a 5 mile radius of the project area, however, construction of the proposed project will not disturb any of the areas.

There is one (1) area of archaeological or historical value within a 5 mile radius of the project area. However, this location of record is far enough away from where construction will take place and so will not be impacted by construction.

Air and noise nuisance impacts may occur, but will be localized and limited to the duration and timing of project construction. All construction activities will occur during daylight hours, and prompt reseeding of disturbed areas will minimize windblown dust concerns.

There will be no operational impacts associated with the use of the Subaqueous Sewer System (SASS). There will be minimal operational impacts associated with the use of the Sewer Access Valve (SAV). While the SAV will allow for the lowering of the lake level more than is currently available, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, per the requirement found in the Town of Lake Lure's NPDES Permit, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. The SAV will also allow for the controlled rise of the lake level. The flow rate used to raise the lake level will not change following the installation of the SAV. Once again, this flow rate is dictated by the Town of Lake Lure's NPDES permit.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new SASS will not be increased as a result of this project. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS when it was designed in 1927. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

1.5 Project Funding and User Fee Increases

The estimated total cost for the combined alternatives project is \$62,480,757. This project received a loan from the Clean Water State Revolving Fund (CWSRF) in the amount of \$12,500,000, and the Phase 1 portion of the project is sized based on the immediate needs and this amount. The amount of funding received is adequate to cover the cost of all construction including any contingency and engineering costs of Phase 1. The Town of Lake Lure will provide funds to cover the cost of the \$250,000 closing fee.

The financial plan to fund Phase 1 involves an increase of rates by 30%. This increase has already been implemented in fiscal year 2020 in order to cover the initial State Revolving Fund (SRF) loan of \$12.5M. This sewer increase has been presented to the Town of Lake Lure (Town) residents via a community forum that is available for public review in the Town's website. Currently, the sewer bill for residential users only is \$69.50. This equates to a %MHI of 1.32%. The current combined residential water and sewer bill is \$120.45. This equates to a %MHI of 2.29%. As the Town's %MHI is less than 4.00%, even with the increase of 30% to the sewer rates, there is currently no financial hardship on users.

To cover the cost of the loan payment, considering only revenue generated by residential customers, the new residential sewer bill at the current interest rate following the completion of the proposed project would have to be increased to \$123.50. This equates to a %MHI of 2.35%. With the additional cost, the Town of Lake Lure's %MHI is slightly greater than 2.0% for the single bill. The new combined residential water and sewer bill at the current interest rate following the completion of the proposed project would have to be increased to \$174.45. This equates to a %MHI of 3.32%. Even with the additional cost, the Town of Lake Lure's %MHI is still less than 4.0% for the combined bill. With the %MHIs below the value threshold set to signify a financial hardship to users who receive a combined bill, the cost of the project would not add any financial hardship to users in order to cover the cost of the loan payment.

1.6 Future Project Phase Financing

As mentioned in Sections 1.1 and 1.3.2 above, due to the magnitude of the issues with the existing wastewater collection system, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate

goal. Section 1.3.2 provides an estimated timeframe to complete those phases, however, an additional component to completing the future phases is the financing of those phases.

The financial plan to fund Phase 1 and all future phases proposes three (3) significant increases in sewer rates along with the application of an annual inflation estimate of 3.5% to meet the anticipated debt service requirements within the ten-year horizon. The first significant increase of 30% has already been implemented in fiscal year 2020 and will cover the initial State Revolving Fund (SRF) loan of \$12.5M. This first sewer increase has been presented to the Town of Lake Lure (Town) residents via a community forum that is available for public review in the Town's website. The current Town budget is structured to immediately assume the expected debt service of Phase 1 design and construction.

The first SRF loan will source revenue for infrastructure that directly services existing sewer customers. After completion of each phase of construction, there is an opportunity to leverage sewer capacity to assume new customers that will provide additional cash reserves through sewer development fees and increased cash flow through expanded sewer user or availability fees. The Town intends to mandate the connection of all residential and commercial sewer effluent to the new system when available. This mandate generally extends to all existing and potential customers that have lakefront access and sewer service available.

To fund future phases, it is anticipated to raise the sewer rates in two (2) steps by 20% each time. While current sewer rates for the Town are among the top rates for North Carolina municipalities, subsequent significant increases are feasible, but will cause rates to significantly exceed the sewer rate norms of the State. The Town has therefore provided a framework of other options to fund subsequent design and construction phases to mitigate the sole dependence on the sewer and water fund.

The Town of Lake Lure (Town), is also looking to impose sewer development fees to new customers and would set rates consistent with the size of living space for the new customer. In addition, once a phase becomes operational and a service lateral becomes available to non-existing customers, an Availability Fee would be charged as an incentive to configure septic or other systems into the new sewer. It is estimated that the number of potential new customers will expand the customer base from septic users in each phase. Sewer Development Fees and Availability Fees would provide a significant and immediate

source of new revenues to form a capital reserve and increase cash flow to source follow-on phases of design and construction.

The Town of Lake Lure will also pursue additional sources of revenue from grants (as they become available) and the Town's general fund, sourced from ad-valorem taxes. In general, the Town recognizes that sewer infrastructure should be sourced from sewer user fees, but the Town is seeking the authority through Special State legislation to apply ad-valorem revenues to this project. This will link property taxes at large to a portion of the revenue sourcing for the sewer infrastructure and will allow the Town to leverage all property owners, rather than limiting the sourcing only to current users, to fund subsequent phases.

The combined effect of new sewer development revenue, imposition of availability fees, application of general fund dollars, payoff of previous debt service, and increased operational efficiencies as the new system becomes operational over the next ten years will mitigate the need to raise sewer rates to unprecedented levels.

Section 2.0 Current Situation

2.1 Collection System Rehabilitation

The proposed rehabilitation project is located in the Mountains Region of North Carolina, in the Town of Lake Lure, in Rutherford County.

2.1.1 Collection System Condition

In order to assess the future needs for the Town of Lake Lure's Collection System, it is necessary to evaluate the current condition of the existing wastewater infrastructure and treatment and the area it serves.

2.1.1.1 Overview of the System

The Town of Lake Lure (Town) was incorporated in 1927 and today encompasses 13.8 square miles. The lake for which the Town is named is just over 800 acres. The lake has approximately 27 miles of shoreline at full pond and is 105 feet deep at its deepest point. The water elevation at full pond is 990.50 above MSL and is capable of being lowered approximately 12 feet to 978.50 above MSL, which is the current, lowest water elevation possible. The lake was created by a hydroelectric dam, completed in 1927 which began producing power the following year. The Town acquired the lake in 1965 and currently maintains the lake, hydroelectric dam, and typical municipal infrastructure. According to the US Census Bureau, the current population of the Town is 1,151 year round and up to 10,000 seasonally. The Town has several private collections systems that discharge into the SASS, including Rutherford County system serving Chimney Rock Village, Rumbling Bald Resort, Blue Heron Point, and Firefly Cove. The Town owns and operates a 0.995 million gallons per day (MGD) Wastewater Treatment Plant (Plant), Triplex Pump Station (PS), and a sanitary collection and conveyance system, a subaqueous sanitary sewer (SASS).

The Plant was originally constructed as a 0.350 MGD activated sludge plant in 1969. Prior to this, the wastewater was discharged directly into the Broad River. In 1991, the Plant was renovated and converted into a physical-chemical process (P/C) and was permitted for an annual average daily flow rate of 0.995 MGD. The Plant continues to struggle to meet the NPDES permit limits during the winter and routinely fails to meet them in the summer months. The main cause of the issues with the Plant are the lake infiltration and

inflow (I&I) and infiltration from the connecting land-based collection systems. These flows are such that the wastewater is diluted to the extent that use of the activated sludge process is not possible, and this was the driving force in converting to a physical-chemical plant. Unfortunately, the current treatment process is ineffective in meeting some of the parameters of the plant's NPDES permit. The Plant has a legacy of frequent NPDES violations that is expected to continue unless changes are made to the Plant or collection system, or both. The current P/C process was not designed to remove ammonia, as such the Plant will continue violate the NPDES ammonia limits. The plant is currently considered "noncompliant" by NCDEQ, with the most frequently cited NOV's being in regards to total suspended solids, ammonia, and flow. The current sludge handling process is the hiring of septic haulers to remove sludge from the digesters and haul to a disposal site. The sludge is removed as needed at the determination of the ORC.

The Pump Station (PS) was originally constructed within the dam during the 1969 construction of the Plant, and served as its influent pumping station. In 2000, the PS was moved to its current location. The PS has three pumps, which indicates that the flow is designed to be handled by up to two of the pumps, with a third on standby. However, due to the elevation of the Plant infrastructure, running all three pumps will cause an SSO at the Plant. Each pump is driven by a 15 horsepower motor and is rated at 459 GPM. The Town desires that if possible, the gravity sewer could be modified to allow for gravity flow to the existing Plant. This would reduce operations and maintenance cost and eliminate the need for capital reinvestment in the PS in the future.

The subaqueous sewer system (SASS) was originally constructed simultaneously with the hydroelectric dam. It consisted of approximately fourteen (14) miles of cast iron gravity sewer. The sewer lines were installed on concrete collars and on wooden cribbing. The cast iron pipe ranges in size from 8-inches to 20-inches. The flow enters the system through 65 manholes that are located along and/or within the lake perimeter. From these manholes, laterals run to the main line that was installed to the north of the pre-lake Broad River bed. The laterals range in diameter from 8-inches to 12-inches. The main interceptor sanitary sewer line consists of 10-inch diameter to 18-inch diameter cast iron pipe. The locations of the manholes have been GPS verified, but the locations of the laterals and main line have been approximated. Much of the line is no longer visible due to silt and sediment, so its exact location is unknown. In 2009, a joint wrap project was undertaken which led to a noticeable reduction in the lake inflow. The joint wrap used has a service

life of 15 years, and is approaching the end of its service life. From observations of the Town staff, the lake inflow is beginning to increase as the pipe wrap and cast iron pipe age and degrade. The most recent upgrade to the SASS is the installation of a shut off valve behind the dam. This valve would shut off the pipe flow in the event of a catastrophic pipe failure in the lake. The SASS is currently considered “noncompliant” by the NCDEQ, due to the excessive inflow and infiltration and the risk of catastrophic failure.

There are three (3) types of infiltration and Inflow (I&I) that occurs within the project sewershed. The first type of I&I is through land based and connecting collection systems. The SASS receives flow from outside users that maintain independent collection systems. Two (2) of these systems are Rumbling Bald Resort and Chimney Rock Village. Both of these systems contribute 69,934 gallons per day (GPD) and 31,885 GPD respectively. The system supplying Chimney Rock Village experiences high peaking factors due to I&I of 7.48. The peaking factors from Rumbling Bald are still being determined. The second type of I&I is high level lake infiltration. This is lake water that enters the system above the 978.00 MSL through manholes and private laterals. This flow has been shown to be approximately 0.235 MGD. The third type of I&I is through low level infiltration, which enters the pipe through the deeper laterals and the main sanitary sewer interceptor. This flow was measured during a late night period when the lake was lowered and found to be approximately 0.20 MGD. In total, the sanitary sewer collection system has around 0.40 MGD of lake infiltration 24 hours a day, 7 days a week, which does not include additional I&I during rain events. The combination of lake infiltration in conjunction with the I&I of the connecting land based systems leads to the overwhelming of the headworks pumping station at the Plant and SSOs.

Due to location and inaccessibility of the SASS, rehabilitation, pipe condition assessments, and repairs are very limited. In short, there is little the Town can do through typical operations and maintenance to reduce the flows that produce SSOs in the system.

The Town has commissioned numerous reports and studies over the recent years. There have been recommendations for the replacement of the SASS with a land-based low pressure sewer system and the replacement of the Plant with a pump station or other biological processes. The Town has concerns over the cost and constructability of the land-based low pressure sewer system and desires for the investigation and consideration of other alternatives for the repair, rehabilitation, or replacement of the SASS. The

previous recommendation for replacing the Plant with a pump station and transferring flows to another locality did not address the SASS noncompliance, but rather only the most obvious symptom, ignoring the underlying cause. While this may be a viable option at some point, until the root cause is corrected any receiving locality will face similar difficulties as the Town has in attempting to treat such diluted flows, and the costs of doing so will be borne (whether directly or via increased transfer fees) by the Town. Furthermore, the Town cannot ignore the risks of catastrophic pipe failure under the lake, for which the Town would be fully liable.

The discharge points of the existing low pressure sanitary sewer collection systems of Sunset Cove and Fisher Court, currently connected to the existing SASS, will be incorporated into the proposed gravity/lift station system (GLS). Also, users within Sunset Cove and Fisher Court that are directly adjacent to the proposed GLS will have a lateral installed by which they may directly connect to the GLS. It is possible that the HOAs of Sunset Cove and Fisher Court may consider disbanding their existing low pressure sanitary sewer collection systems once the proposed GLS is installed.

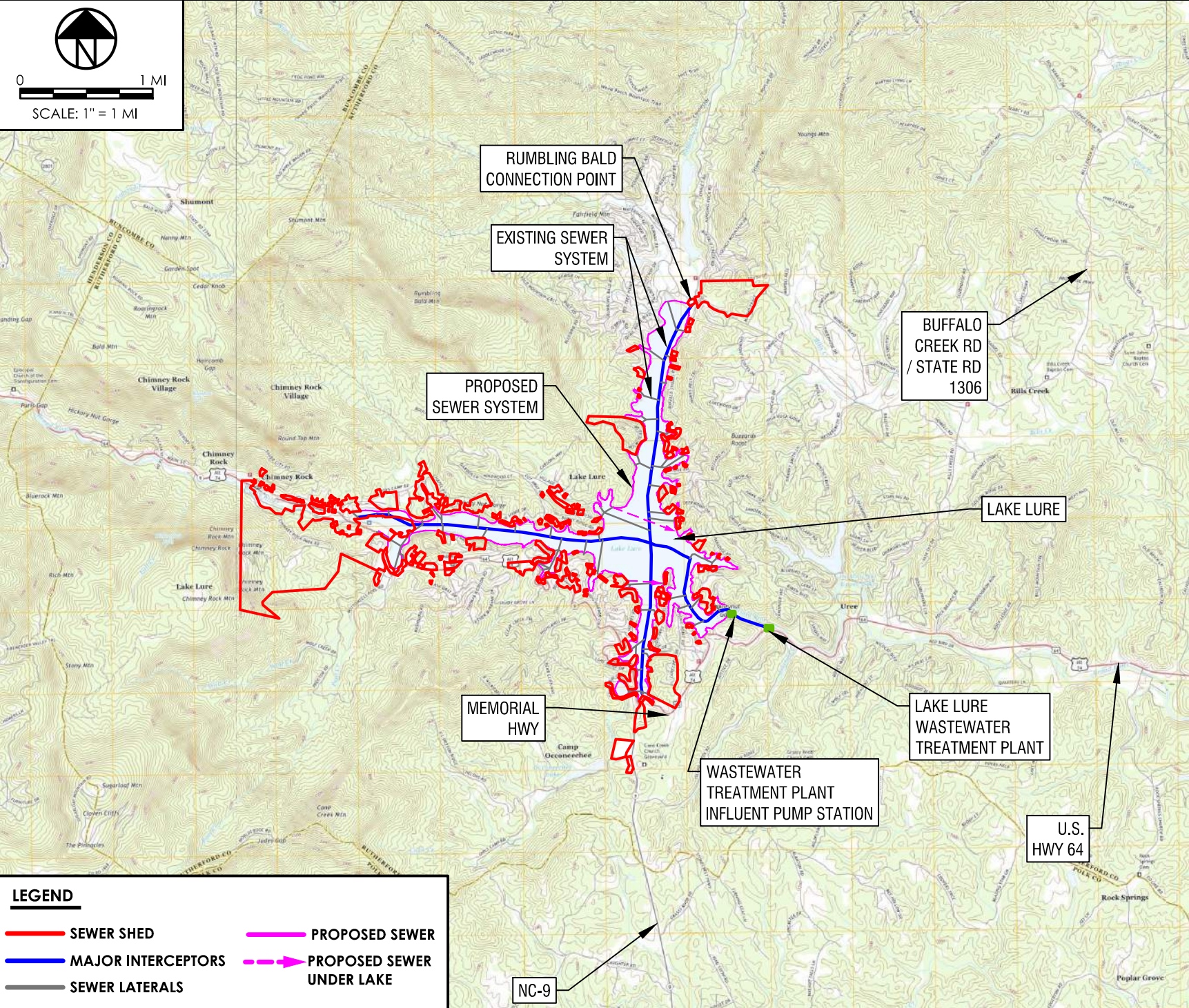
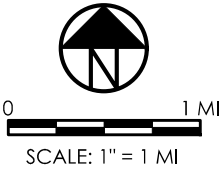
The Town of Lake Lure has been in discussions with the North Carolina School of Government, Environmental Finance Center (EFC), for recommendations on short and long term connection policies. Based on EFC's guidance and internal discussions, the TOLL will implement availability charges and development charges as the new sewer service becomes available to users, which are not currently connected. Those users will be given a timeline for mandatory connection following the completion of each phase.

Figure 2.1 is a vicinity map showing the Lake Lure Sewershed and the locations of all pump stations within the sewershed area. Figure 2.2 is a project location map showing the collection system lines including diameters and flow directions within the Lake Lure Sewershed.

The entire collection system collects wastewater from approximately 1,032 service connections that serve a population of approximately 1,150. In 2019, the SASS and Wastewater Treatment Plant conveyed and treated approximately 0.5355 MGD on a daily average basis. Within the Lake Lure Sewershed, the current collection system includes approximately 6.6 miles of 10-inch to 18-inch diameter sanitary gravity sewer interceptors, 200 feet of 12-inch diameter sanitary sewer force mains, approximately 7.2 miles of 4-inch

to 10-inch diameter sanitary sewer laterals, and 1 sewage lift station. The influent pump station has a capacity of 915 gallons per minute (gpm).

The gravity sewer pipes and force mains within the Lake Lure Sewershed are made of cast iron pipe. The age of the components in the system range from 51 years old to 93 years old. Table 2.1 lists the various types, diameters, and quantities of pipe and sewage lift station capacity in the Lake Lure Sewershed.



LEGEND

- SEWER SHED
- MAJOR INTERCEPTORS
- SEWER LATERALS
- PROPOSED SEWER
- ➔ PROPOSED SEWER UNDER LAKE

Comm. No. 2200559

Figure 2.1

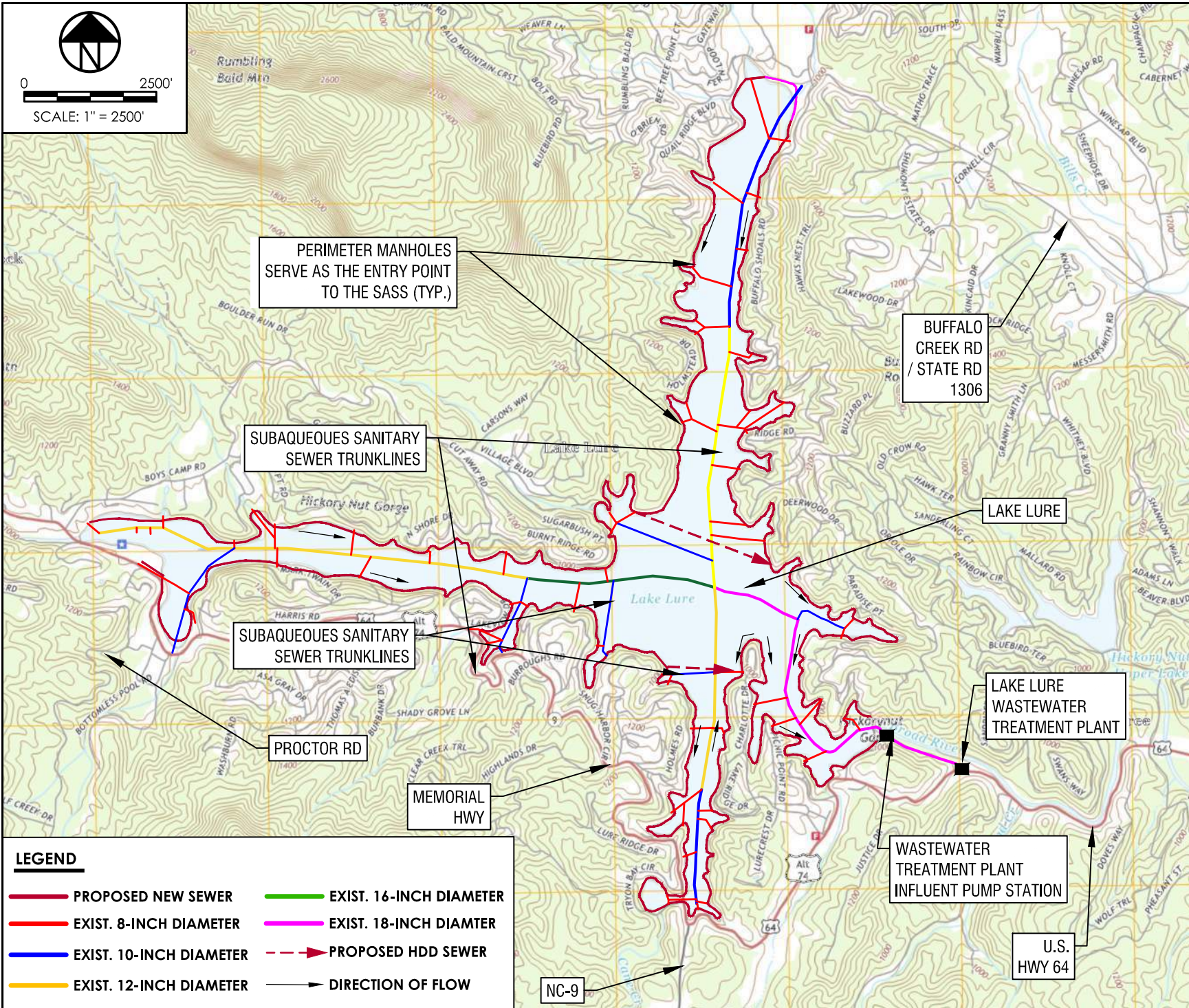
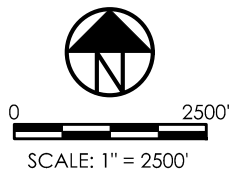
September 2020

System Overview Vicinity Map

Lake Lure Sewer System

Lake Lure, North Carolina





PERIMETER MANHOLES
SERVE AS THE ENTRY POINT
TO THE SASS (TYP.)

SUBAQUEOUS SANITARY
SEWER TRUNKLINES

SUBAQUEOUS SANITARY
SEWER TRUNKLINES

PROCTOR RD

MEMORIAL
HWY

BUFFALO
CREEK RD
/ STATE RD
1306

LAKE LURE

LAKE LURE
WASTEWATER
TREATMENT PLANT

WASTEWATER
TREATMENT PLANT
INFLUENT PUMP STATION

U.S.
HWY 64

NC-9

LEGEND

	PROPOSED NEW SEWER		EXIST. 16-INCH DIAMETER
	EXIST. 8-INCH DIAMETER		EXIST. 18-INCH DIAMETER
	EXIST. 10-INCH DIAMETER		PROPOSED HDD SEWER
	EXIST. 12-INCH DIAMETER		DIRECTION OF FLOW

Comm. No. 2200559

**Figure
2.2**

September 2020

**Project Vicinity Map
Lake Lure Sewer System
Lake Lure, North Carolina**



Table 2.1. System Overview					
Subaqueous Sanitary Sewer Replacement					
Town of Lake Lure					
Appendix reference for figures:					N/A
Appendix reference for supporting information:					Appendix B
Pump Stations					
Pump Station Name	Firm Pumping Capacity (gpm)	Force Main Length (l.f.)	Force Main Diameter(s) (inches)	Force Main Material (if known)	Force Main Age (if known)
Influent Pump Station	915	200	12	Cast Iron	51
Gravity Sewers – Interceptor					
Length (l.f.)	Diameter (inches)	Material (if known)		Age (if known)	
7,019	10	Cast Iron		93	
17,074	12	Cast Iron		93	
3,582	16	Cast Iron		93	
1,566	18	Cast Iron		51	
5,472	18	Cast Iron		93	
Gravity Sewers – Laterals					
Length (l.f.)	Diameter (inches)	Material (if known)		Age (if known)	
895	4	Cast Iron		93	
30,349	8	Cast Iron		93	
7,008	10	Cast Iron		93	

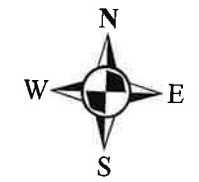
2.1.2 Sewered vs. Unsewered Lots

There are currently 926 residential connections and 106 commercial connections for a total of 1,032 connections. It is assumed that all existing structures that are not on the SASS are on septic tanks. There are 230 residences with septic tanks that are Lake Front and an additional 215 residences with septic tanks that are off the lake but within the sewer shed. This amounts to a total potential users of 1,477. Figures 2.3 and 2.3A are maps of the sewered versus unsewered lots in the sewer shed.

Town of Lake Lure

Sewer Shed

Sewered Vs. Unsewered



Legend

Parcels

 <all other values>

User_Type

 Private Sewer

 Road

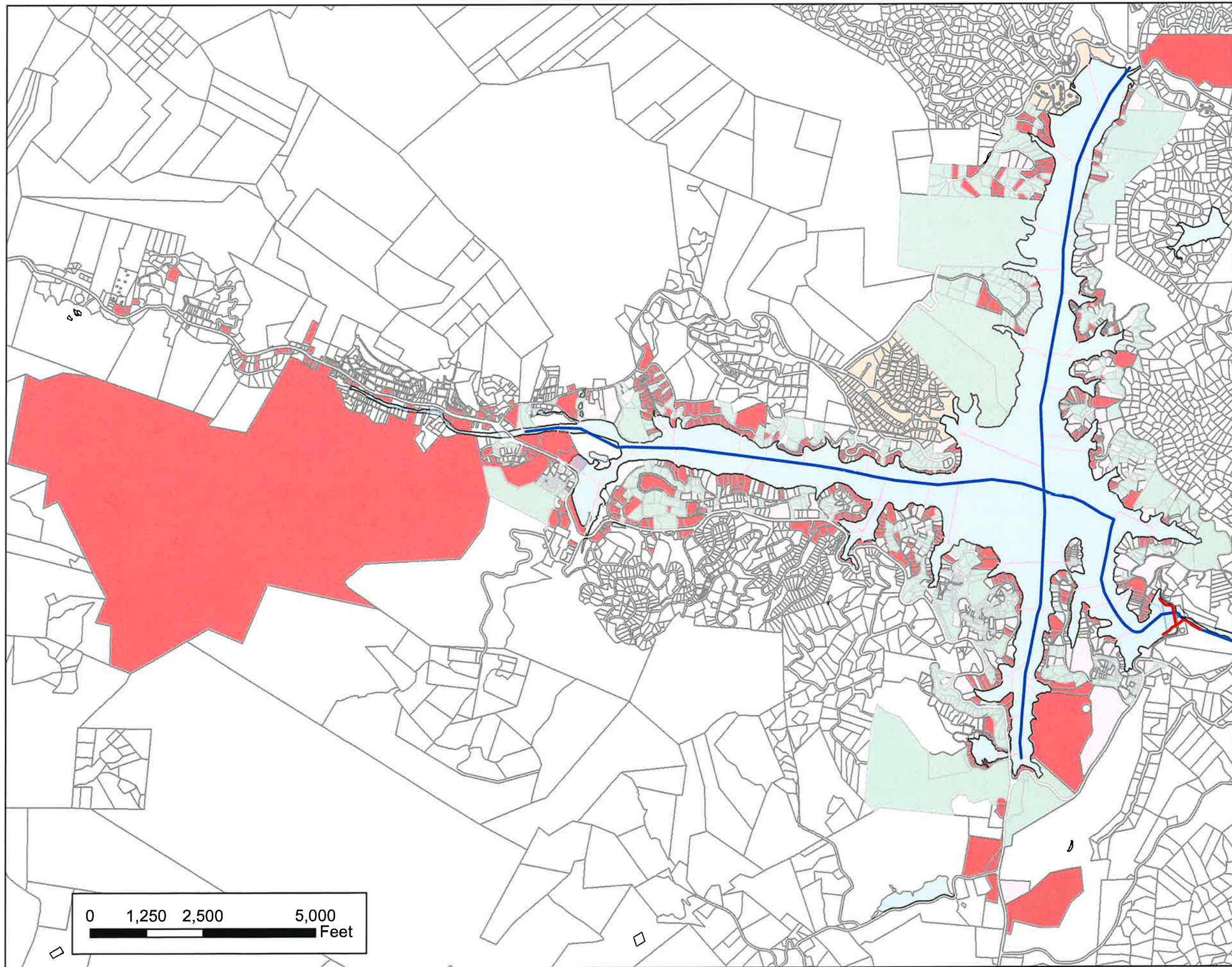
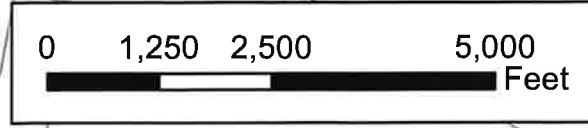
 Septic

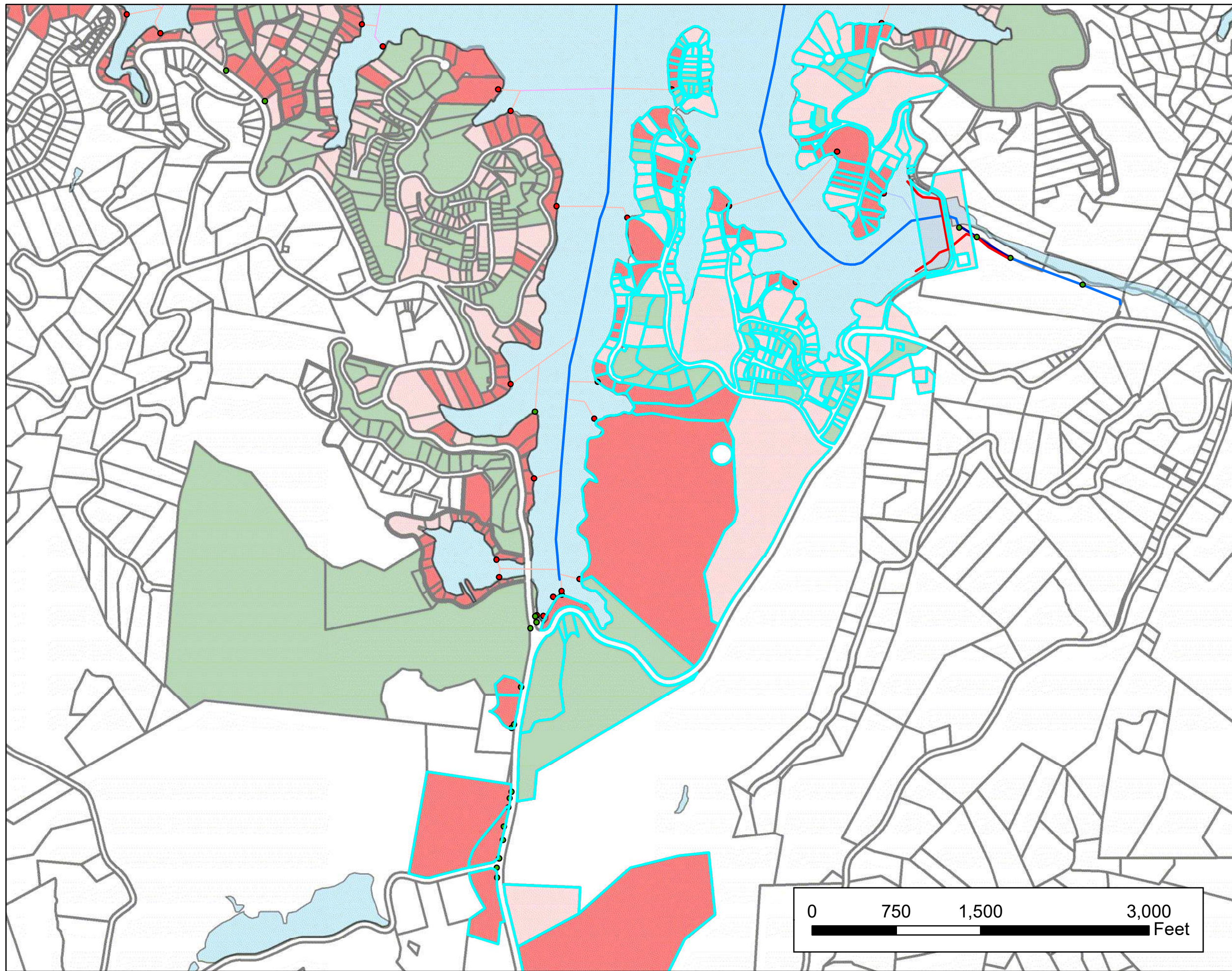
 Sewered

 TOLL

 Undeveloped

Figure 2.3

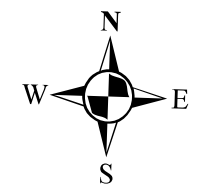




Town of Lake Lure

Phase 1

Sewered Vs Unsewered



Legend

Parcels

User_Type

- Private Sewer
- Road
- Septic
- Sewered
- TOLL
- Undeveloped

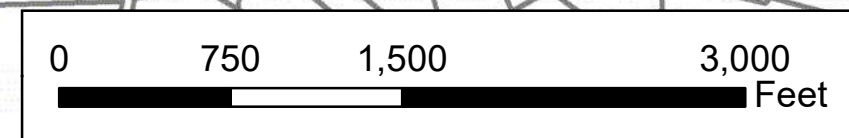


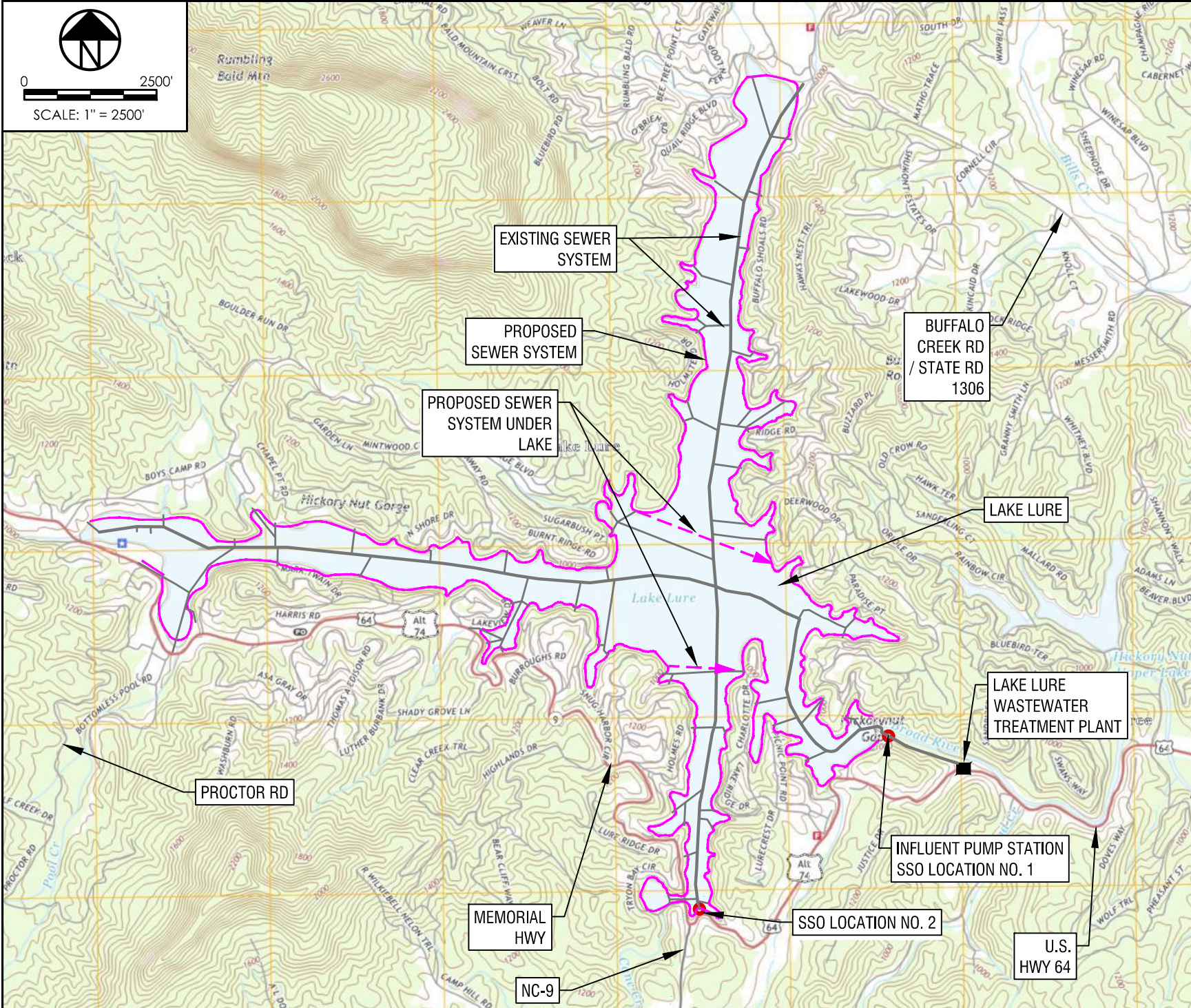
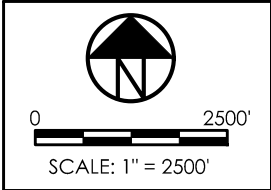
Figure 2.3A

2.1.3 History of Overflows

One of the primary purposes of a wastewater system is to contain and convey wastewater to the treatment facility without spilling the wastewater into the environment. When the wastewater is not contained and/or conveyed in the system, a Sanitary Sewer Overflow (SSO) results. A SSO can have a significant negative impact on the public health and natural environment of a community. These overflows can be caused by many factors such as excessive inflow and infiltration, grease buildup, and root intrusion but are typically a result of blockages in sewer mains caused by the collapse of the pipe and/or an accumulation of debris in the system.

Table 2.2 lists the overflows that occurred in the Lake Lure Sewershed. Appendix C provides SSO documentation for the years 2014 through 2019, if any occurred. Figure 2.4 shows the locations of SSOs listed in the table. During these years, within the Lake Lure Sewershed, a total of 4 SSO occurred. The spills reached surface waters. The spill volume ranged from 250 gallons to 119,000 gallons. The SSOs that occurred in the Lake Lure Sewershed occurred due to varying reasons. Currently, the Lake Lure wastewater collection system is negotiating a Special Order by Consent (SOC).

Table 2.2. SSO Description and Special Orders Subaqueous Sanitary Sewer Replacement Town of Lake Lure				
Figure number for SSO map:				2.4
Appendix Number for SSO Reports and Special Orders:				Appendix C
Date	Location	Brief Description of Cause	Estimated Amount Spilled (gal)	Map Key
06/08/19	Influent PS	Equipment Failure	119,000	1
09/12/19	Manhole 34.1	Debris in Line	250	2
05/19/20	Influent PS	I&I	765	1
02/06/20	Influent PS	I&I	11,760	1
Does the Applicant have a SOC, pending SOC, Administrative Order or other special order? <input type="checkbox"/> Yes, SOC is in place. <input checked="" type="checkbox"/> Yes, SOC is pending. <input type="checkbox"/> No				



Comm. No. 2200559

Figure 2.4

September 2020

SSO Map

Lake Lure Sewer System

Lake Lure, North Carolina



2.1.4 Collection System Issues

Table 2.3. Collection System Issue Description Subaqueous Sanitary Sewer Replacement Town of Lake Lure	
Supporting Information Appendix Reference:	Appendix B
<p>Cast iron sanitary sewer lines were installed on concrete collars and wooden cribbing. Many of the sanitary sewer lines are no longer visible due to silt and sediment, so their exact locations are unknown. Over time the cast iron pipe and wooden cribbing have deteriorated.</p> <p>Due to the deterioration of the cast iron pipe, infiltration and inflow (I&I) has steadily increased over the years. In 2009, a joint wrap project was undertaken which led to a noticeable reduction in the lake I&I. However, the joint wrap used has a service life of 15 years and so is approaching the end of its service life. From observations of the Town staff, the lake I&I is beginning to increase as the pipe wrap and cast iron pipe continues to age and degrade.</p> <p>The SASS is currently considered “noncompliant” by the NCDEQ, due to the excessive I&I and the risk of catastrophic failure as the cast iron pipe continues to deteriorate.</p> <p>The combination of lake I&I, in conjunction with the I&I of the connecting land based systems, leads to the overwhelming of the headworks pumping station at the Plant and results in SSOs.</p> <p>The Plant continues to struggle to meet the NPDES permit limits during the winter and routinely fails to meet them in the summer months. As mentioned above, the main cause of the issues with the Plant are the lake I&I and I&I from the connecting land-based collection systems. These flows are such that the wastewater is diluted to the extent that use of the activated sludge process is not possible, and this was the driving force in converting to a physical-chemical plant. Unfortunately, the current treatment process is ineffective in meeting some of the parameters of the plant’s NPDES permit. The Plant has a legacy of frequent NPDES violations that is expected to continue unless changes are made to the Plant or collection system, or both. The current P/C process was not designed to remove ammonia, as such the Plant will continue violate the NPDES ammonia limits. The plant is currently considered “noncompliant” by NCDEQ, with the most frequently cited NOV’s being in regards to total suspended solids, ammonia, and flow.</p> <p>The pump station has three (3) pumps, with the intention of the flow to be handled by two (2) pumps with the third pump on standby. However, due to the elevation of the Plant infrastructure, running all three pumps can cause an SSO at the Plant.</p>	

2.1.5 Rehabilitation/Replacement Prioritization

Project involving collection system rehabilitation and replacement fall into one of three categories. The first category is a collection system where a full Sewer System Evaluation Survey (SSES) has already been completed for some, if not all, of the collection system. The second category is a collection system where a partial SSES has been completed.

The third category is a collection system where no work toward prioritizing rehabilitation or replacement of the collection system has been completed. In the case of the proposed project, a partial SSES has been completed.

2.1.5.1 Portions of Sanitary Sewer Evaluation Study Completed

Table 2.4.1. Summary of Work Accomplished to Prioritize Collection System Components for Rehabilitation/Replacement Subaqueous Sanitary Sewer Replacement Town of Lake Lure	
Additional Information Appendix Reference:	N/A
<p>The SSES has been completed directly for approximately 14% of the SASS and indirectly for the complete system. In 2007 a project to CCTV and physically inspect the manholes was completed. Due to the inaccessibility of the submerged pipe, only 14% of the lines were able to be CCTV. In all the cases, the camera could not proceed forward due to obstructions, bends, boxes, or reached its operational length. The CCTV indicated heavy deterioration of the SASS. The WWTP experiences high level of iron concentration. To verify the source of the iron, samples were taken from the lake and entering the SASS and compared with those taken within the existing SASS. The concentration of iron existing within the SASS was 77 times higher than that entering the SASS, which indicates the corrosion and deterioration of the system. Due to the inaccessibility of the SASS, it is not desirable to rehabilitate the collection system. The SASS will be abandoned and an independent system installed to replace it.</p>	

Table 2.4.2. Priority Evaluation Results for Sewers Needing Rehabilitation/Replacement Subaqueous Sanitary Sewer Replacement Town of Lake Lure			
Gravity Sewer Location I.D.	Priority Score	Cost	Part of Proposed Project?
Main Line and Laterals	1	\$53,645,285	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Manholes	1	\$506,000	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Total Cost of Collection System Needing Rehabilitation/Replacement:		\$54,151,285	
Total Cost of Collection System To Be Replaced/Rehabilitated as Part of Project:		\$12,500,000	

2.1.6 Current Population

In order to ensure that the proposed infrastructure improvements will meet the future needs of the community, it is important to obtain an accurate estimate of the population and demographics that are and will be served by the infrastructure. This information is then used to estimate future populations, which is then used to estimate future wastewater

flows. These estimated future flows are used to size infrastructure to meet current and future service needs. There are two methods generally used for estimating the current population for a sewer service area.

The first method determines the number of dwelling units in a defined area and a known population to estimate the average number of persons per dwelling unit. The number of people per dwelling unit is multiplied by the number of dwellings in the area being studied in order to determine the population. This method is generally used for smaller areas such as new housing developments.

The second method of estimating population is generally used for larger areas served by large interceptor sewers. This method utilizes information from the 2010 U.S. Census as a basis for the current population. The population and size of the LGU, population density per square mile in the LGU, size of the WWTP service area, and the size of the project sewershed service area within the WWTP service area is used to determine the current population within the project sewershed.

While this project does involve the construction of sanitary sewer lines to intercept and collect all flows from the service area that encompasses the Lake Lure Sewershed, it is difficult to determine the population in the sewershed as population distribution of the Town of Lake Lure is more dense around the lake, and therefore the sewershed, and more scattered farther away from the lake one moves. The persons per square mile data available from the U.S. Census is not an accurate representation of density around the lake and so within the sewershed. Due to these limitations, the first method for estimating the current population for a sewer service area is utilized.

A summary of this data is presented in Table 2.5. The number of 3 bedroom dwelling units within the sewershed area is provided. These dwelling units are located within the Lake Lure Sewershed Area and include the areas of the Town of Lake Lure, Rumbling Bald Resort, and Chimney Rock. Additional information relating to overall population can be found in Appendix D and Appendix I. Appendix I includes a portion of the 2010 U.S. Census listing population information for the Town of Lake Lure and Chimney Rock. Rumbling Bald Flow data can be found in Appendix D and includes a calculation of population based on flow data.

Estimating the seasonal population of Lake Lure is difficult as some of those who visit Lake Lure, visit for only the day, with no overnight stay, and impact the collected sewer flow very little, if at all. It is estimated the seasonal population of Lake Lure, that includes year-round residents of Lake Lure, is approximately 10,000, as found on the Town of Lake Lure website. The current population found in Table 2.5 does not include the seasonal population.

Table 2.5. Current Population Analysis Method 1 - Limited Service Area Subaqueous Sewer System Replacement Town of Lake Lure		
U.S. Census Place or County:		Rutherford
Appendix Reference for U.S. Census Information:		Appendix I
Bedrooms/Dwelling Unit^a	Dwelling Units	Bedrooms
2		0
3	926	2,778
4		0
5		0
Total Dwelling Units:	926	2,778
Total Current Population from ACS:	2,315	
Persons per Dwelling Unit:	2.50	
Dwelling Units in Service Area:	926	
Current Population in Sewershed Service Area:	2,315	
Total Bedrooms/Dwelling Unit:	3.00	

^aZero- or one-bedroom dwellings should be included within the 2 bedroom category.

2.1.7 Current Wastewater Flows

There are three general methods used to estimate current wastewater flows. The first method involves using flow meter data to determine flow from the sewershed. This method is typically used in areas where metering data is available. If flow meters are not in place to monitor flow, the second method used to determine flow from the sewershed is based upon pump drawdown test and run times. If pump drawdown test and run times are not readily available, the third method used to determine flow from the sewershed is based upon the North Carolina 2T Standards, 15A NCAC 02T .0114.

In the case of the Lake Lure Sewershed, there is metering data available as metering of wastewater occurs at the wastewater plant. Flow information for the year 2019, provided by the Town, is included in Appendix D. It should be noted that a majority of the flow the

Plant receives comes from lake infiltration through the existing subaqueous sanitary system (SASS). The metering data from the Plant shows the Plant received and treated 0.5355 MGD of wastewater in 2019. However, it is estimated that a majority of the wastewater received by the Plant is from lake infiltration. In an effort to obtain a more accurate account of the current flow in the SASS, excluding the lake infiltration, current wastewater flows will be determined using the current population of the service area and applying wastewater flows of 70 gal/day-capita to that population. Table 2.5 shows the current population within the sewershed as 2,315. Applying wastewater flows of 70 gal/day-capita to that population, current wastewater flow in the sewershed equals 162,050 gpd. The current flow analysis using this flow and the North Carolina 2T Standards is shown in Table 2.6 below.

Table 2.6 Current Flow Analysis Subaqueous Sewer System Replacement Town of Lake Lure	
Current and Obligated Wastewater Treatment Plant Flow	
Average Daily Flow for Most Recent Year (gpd):	162,050
Estimated Obligated Average Daily Flow (gpd):	0
Current Collection System Flow	
Current Flow Determination Methodology:	North Carolina 2T Standards
Current Flow Appendix Reference:	Appendix D
North Carolina 2T Standards	
Is flow data available:	No
If Yes, Peak Hour Flow Rate (gpd):	N/A
If Yes, Average Daily Flow (gpd):	N/A
If No, select Current Population Methodology Used:	Method 1 - Limited Service Area
Current Population:	2,315
Peaking Factor:	3.5
Average Daily Flow in the Project Sewershed (gpd):	162,050
Peak Flow in the Project Sewershed (gpd):	572,934

The Town of Lake Lure is a seasonal vacation destination for day and overnight tourists. The typical highest monthly flow occurs in July and the lowest during the early spring. This variation in population causes a seasonal variation in the average daily flow to the WWTP. To determine this variation, the four year period from 2016-2019 was used. 2020 flow data

is available, however this was not used do to a change in the typical vacation patterns as a result of the Covid-19 restrictions. The monthly average daily flow for each month from each of the 4 years is divided by the average daily flow for the entire period to develop a seasonal peaking factor (SPF) for each month of the year. The highest SPF occurred in July with an SPF of 1.25 and the lowest in March with an SPF of 0.72. This information is pulled from the data in Appendix D and a summary of the SPF per month is available in table and chart form in Appendix D.

2.2 Wastewater Treatment Plant Equipment Repair and Replacement

Determining the current condition of the Town of Lake Lure’s Wastewater Treatment Plant (Plant) is important to provide an insight into not only the overall condition of the Plant but also the condition of the equipment that is proposed to be repaired or replaced. Describing the current condition will also help establish the need for the project.

2.2.1 Current WWTP Condition

In order to assess the future needs for the Town of Lake Lure’s Wastewater Treatment Plant (Plant), it is necessary to evaluate the current condition of the Plant. Table 2.7 provides an assessment of the current condition of the Plant.

Table 2.7. General WWTP Condition Subaqueous Sewer System Replacement Town of Lake Lure	
Project Location Figure Reference:	Figures 1.1 and 1.2
<p>The Plant was originally constructed as a 0.350 MGD activated sludge plant in 1969. Prior to this, the wastewater was discharged directly into the Broad River. In 1991, the Plant was renovated and converted into a physical-chemical process (P/C) and was permitted for an annual average daily flow rate of 0.995 MGD. The Plant continues to struggle to meet the NPDES permit limits during the winter and routinely fails to meet them in the summer months. The main cause of the issues with the Plant are the lake infiltration and inflow (I&I) and infiltration from the connecting land-based collection systems. These flows are such that the wastewater is diluted to the extent that use of the activated sludge process is not possible, and this was the driving force in converting to a physical-chemical plant. Unfortunately, the current treatment process is ineffective in meeting some of the parameters of the plant’s NPDES permit. The Plant has a legacy of frequent NPDES violations that is expected to continue unless changes are made to the Plant or collection system, or both. The current P/C process was not designed to remove ammonia, as such the Plant will continue violate the NPDES ammonia limits. The plant is currently considered “noncompliant” by NCDEQ, with the most frequently cited NOV’s being in regards to total suspended solids, ammonia, and flow.</p>	

**Table 2.7. General WWTP Condition
Subaqueous Sewer System Replacement
Town of Lake Lure**

The physical-chemical process involves dosing the wastewater with alum to facilitate the settlement of the suspended solids. The 350,000 gallon existing aeration basin was converted into a sediment basin, where the floc is allowed to settle. The settled sludge is pumped into a holding tank and disposed of by land application. The disinfection is accomplished with the addition of an oxidizer, sodium hypochlorite. Excess chlorine residual is removed by sulfur dioxide. The sludge holding tank is only 50% utilized as a result of structural deficiencies that allow sludge to leak if completely filled and so the ability to completely thicken the sludge and decant is taken away.

Changes were made in 2019 to the sludge handling by the addition of geotubes to thicken and dewater sludge. These have only been marginally effective due to the high moisture content of the sludge. Additional investigation is occurring to find different methods of sludge handling to improve efficiency and reduce operational cost.

A majority of the flow the Plant receives comes from lake infiltration through the existing subaqueous sanitary system (SASS). As shown in Table 2.5, the Plant received and treated 0.5355 MGD of wastewater in 2019. However, it is estimated that 0.4000 MGD of this wastewater is from lake infiltration, leaving only 0.1355 MGD of wastewater generated by users.

NPDES or Non-Discharge Permit No.		NC0025381	
Year	ADF (MGD)	Year	ADF (MGD)
2017	0.3924	2019	0.5355
2018	0.4987	2020	0.5393
Current Flow (MGD):		0.5355	
WWTP Permitted Flow (MGD):		0.995	
Percentage of Capacity Currently Utilized:		53.8%	
NOVs		Special Orders	
Does the WWTP have any NOVs? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (new construction only)		Does the WWTP have any Special Orders or pending SOCs? <input type="checkbox"/> Yes, Special Order is finalized <input checked="" type="checkbox"/> Yes, Special Order is pending <input type="checkbox"/> No	
Appendix Reference:	Appendix E	Appendix Reference:	Appendix E
The NOVs include violations for excess flow, ammonia concentration, and total suspended solids concentration.		The SOC is based on the plants inability to treat ammonia and reflective of the inefficiencies in treating BOD and TSS. The SOC is being negotiated relative to the limits related to BOD, TSS, Ammonia, and Iron.	
Appendix Reference for permit:		Appendix E	
The NDPEs permit is a two (2) tier permit. The tiers are based on the average annual daily flow of the previous year. The two (2) tiers are based on a flow of 0.495 MGD and 0.995 MGD and are indicated in the following tables:			

**Table 2.7. General WWTP Condition
Subaqueous Sewer System Replacement
Town of Lake Lure**

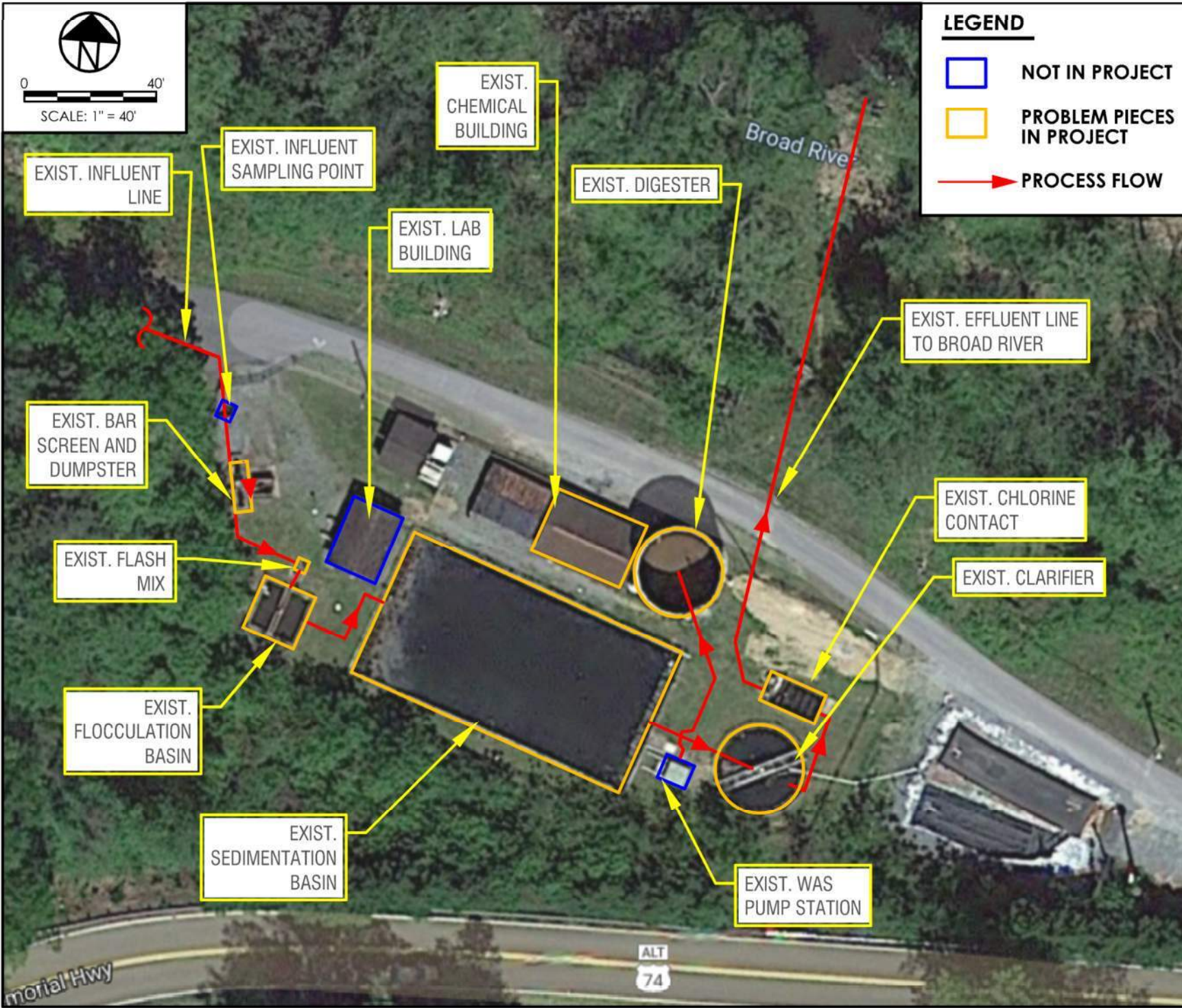
Effluent Characteristics	Limits	
	Monthly Average	Weekly Average
Flow	0.495 MGD	
BOD, 5-day	30.0 mg/L	45.0 mg/L
Total Suspended Solids	30.0 mg/L	45.0 mg/L
NH ₃ as N (April 1 - October 31)	9.4 mg/L	28.2 mg/L
NH ₃ as N (November 1 - March 31)	Monitor and Report	

Effluent Characteristics	Limits	
	Monthly Average	Weekly Average
Flow	0.995 MGD	
BOD, 5-day	30.0 mg/L	45.0 mg/L
Total Suspended Solids	30.0 mg/L	45.0 mg/L
NH ₃ as N (April 1 - October 31)	5.2 mg/L	15.6 mg/L
NH ₃ as N (November 1 - March 31)	Monitor and Report	

2.2.2 Wastewater Treatment Plant Treatment Train Condition

It is also necessary to evaluate the treatment train where the specific pieces of equipment are proposed to be repaired or replaced, in order to assess the future needs for the Town of Lake Lure’s Wastewater Treatment Plant (Plant). Figure 2.5 is a flow diagram showing each piece of equipment within the treatment train, highlighting the pieces of equipment proposed to be repaired or replaced. Figure 2.6 is an aerial photo showing the existing dam, hydro plant, influent pump station, and Plant. Table 2.8 provides a description of the treatment train.

Table 2.8. Description of Treatment Train Subaqueous Sewer System Replacement Town of Lake Lure			
Supporting Information Appendix Reference:	Appendix F	Photo Appendix (if applicable):	Appendix G
Project is located in: <input checked="" type="checkbox"/> Liquid Treatment Train <input checked="" type="checkbox"/> Sludge/Solids Treatment Train			
<i>Project repairs/replaces the following:</i>			
The project will involve all components of the WWTP, it will start with correcting the installation of the step screen, the addition of a grit removal system, the conversion of the flocculation basin to an influent pump station, the construction of a future process train, the demolition and replacement of the existing sediment basin into two process trains, the construction of a new clarifier, the demolition and replacement of the existing clarifier, the demolition and replacement of the existing digester, the construction of an additional digester, and the rehabilitation of the chlorine contact chamber.			
<i>Describe the treatment train(s) where the proposed project will occur.</i>			
The proposed project will occur to nearly all the current components of the WWTP.			
Size	Age	Condition	
0.995 MGD	51	<input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor	
<i>Provide any additional information related to the treatment train(s) where the project will occur.</i>			
The current process system is not capable of meeting the NPDES limits. This is primarily due to the lake infiltration that enters through the collection system that dilutes the wastewater to the point that biological treatment is not possible. The inability to support a biological treatment process requires a physical chemical process that can not treat ammonia. The WWTP will be at risk of process failure as long as the current collection system is in operation.			



LEGEND

- NOT IN PROJECT
- PROBLEM PIECES IN PROJECT
- PROCESS FLOW

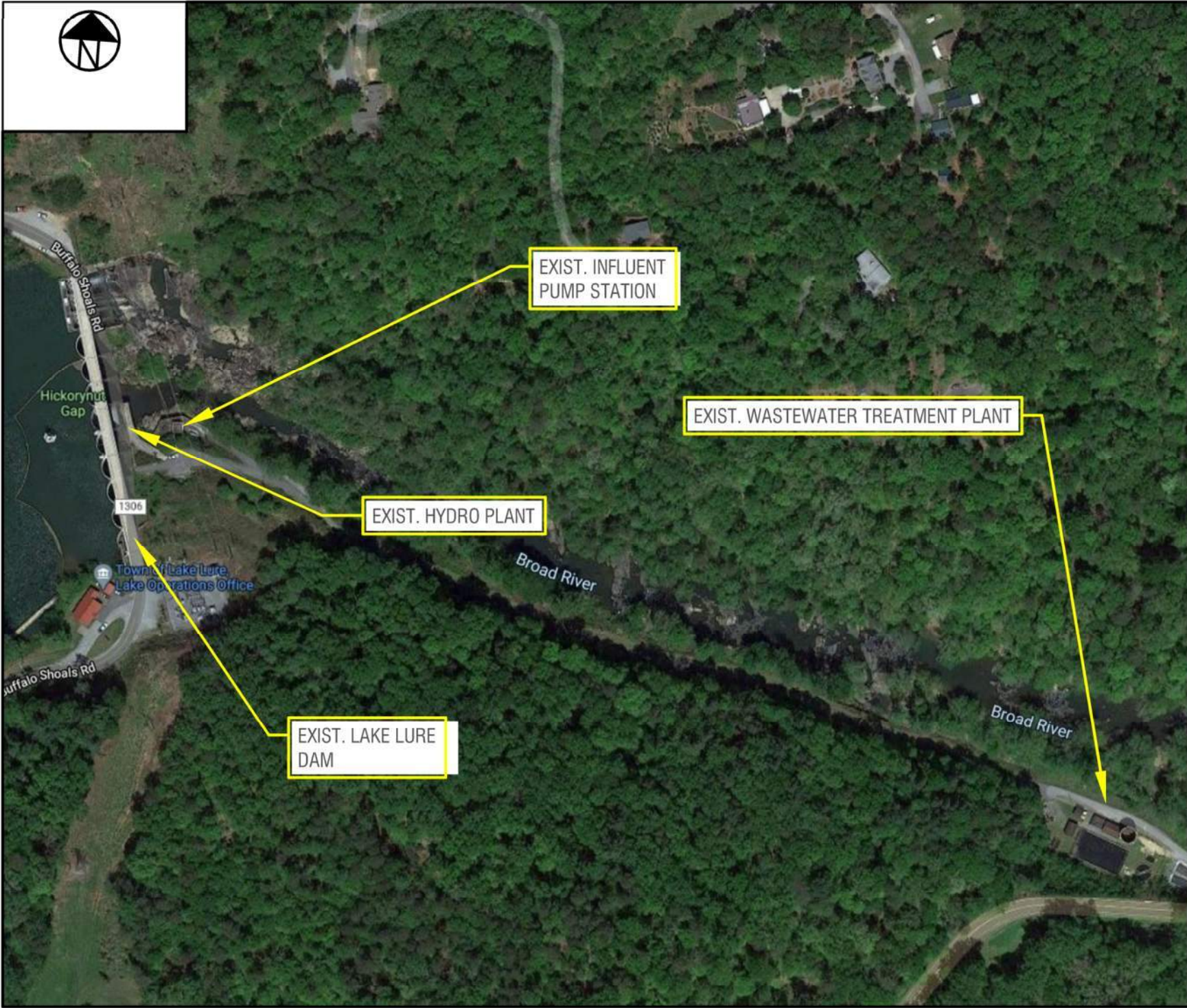
Comm. No. 2200559

Figure 2.5

September 2020

WWTP Flow Diagram
Lake Lure Sewer System
 Lake Lure, North Carolina





Comm. No. 2200559

Figure
2.6

December 2020

Influent Pump Station Lake Lure Sewer System Lake Lure, North Carolina

2.2.3 Specific Equipment Issues

Part of the proposed project involves the installation of a fine screen and the replacement of the digester. Tables 2.9.1 through 2.9.8 provides descriptions of these specific pieces of equipment.

Table 2.9.1. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Fine Screen					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input checked="" type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor		10		2.0 MGD	
Additional Information					
The single fine step screen is installed incorrectly and allows flow and solids to bypass the screen and flow into the sediment basin. The structure is below the hundred year flood elevation. The fine screen has a piped bypass, but not a screened bypass.					

Table 2.9.2. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Digester					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor		51		95,000 GAL	
Additional Information					
The Digester is at the end of its usable life. It is structurally deficient and not able to meet its design intent.					

Table 2.9.3. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Flash Mix					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor		21		2.0 MGD	
Additional Information					
The flash mix should be maintained until a biological process can be resumed. The structure is below the hundred year flood elevation.					

Table 2.9.4. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Flocculation Basin					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor		21		2.0 MGD	
Additional Information					
The flocculation basin shows some signs of acid attack along the water line. The structure is below the hundred year flood elevation.					

Table 2.9.5. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Sedimentation Basin					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor		59		0.995 MGD (ADF)	
Additional Information					
The sediment basin is located below the hundred year flood elevation. The concrete structure is of an unknown condition. The structure does not meet the current structural codes related to reinforcing and thickness. The water depth is lower than desirable for a biological process.					

Table 2.9.6. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Secondary Clarifier					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor		59		0.589 MGD	
Additional Information					
The secondary clarifier is located below the hundred year flood elevation. The concrete structure is of an unknown condition. The clarifier at 8-feet of water depth is considerably shallower than the current 12-feet recommended. In addition, the clarifier is undersized for the current flow rate. The size indicated is based on an SOR of 1,200 gpd/ft ² .					

Table 2.9.7. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Chlorine Contact Chamber					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input type="checkbox"/> Good <input type="checkbox"/> Fair <input checked="" type="checkbox"/> Poor		59		2.0 MGD	
Additional Information					
The chlorine contact chambers shows concrete degradation and sedimentation. The structure is below the hundred year flood elevation.					

Table 2.9.8. Specific Equipment Description Subaqueous SewerSystem Replacement Town of Lake Lure Chemical Feed Pumps					
Picture Reference:	Appendix G	Diagram Reference:	Figure 2.5	Additional Information Reference:	N/A
Condition		Age		Size	
<input type="checkbox"/> Good <input checked="" type="checkbox"/> Fair <input type="checkbox"/> Poor		7		15 GPD	
Additional Information					
The chemical feed pumps appear to be in good working order.					

Section 3.0 Future Situation

3.1 Population Projections

Once the current population and flow rates have been determined, these values are used to estimate future population growth as well as future wastewater flow increases due to population growth. The ultimate goal of estimating future populations is to project future flows as accurately as possible to allow for the most efficient design of infrastructure. The current population and flow data along with the projected future population are used as a basis to project future flows.

Population projections for this project will span the next 20 years as this time frame is the expected design life for most projects, including the proposed project. The future population will be based upon the current LGU population, the percentage of the LGU population that is located in the county, the current year county population, and the percentage of the service area in the LGU. Future population projections for counties in North Carolina from the State Data Center (SDC) will also be used.

Table 3.1 lists the projected populations of Rutherford County, the LGU, and the proposed project's sewershed service area. The seasonal population of Lake Lure is taken into account to determine the current population and current flow, however, it assumed to be a constant population over the years. Therefore, population projections will consist of the populations of the Town of Lake Lure, Chimney Rock Village, and Rumbling Bald Resort. The seasonal population will then be added to those yearly population projections to provide a more accurate projection of future population in the sewershed area. Again, it is estimated the seasonal population of Town of Lake Lure is approximately 10,000 persons, a number that includes the year-round population. From Table 2.5, the current population is estimated to be 2,315 persons, leaving approximately 7,678 persons as the seasonal population ($2,315 + 7,678 = 10,000$). The first year of the projection is 2020, the current year. The projected population of the sewershed service area after the proposed project has been in place for 20 years is 2,531, excluding the seasonal population. Including the constant seasonal population, the projected population of the sewershed service area after the proposed project has been in place for 20 years is 10,209. A portion of the 2010 U.S. Census showing current population information and SDC documentation showing population projections can be found in Appendix I.

Table 3.1. Future Population Analysis Subaqueous Sewer System Replacement Town of Lake Lure					
Current Population Methodology:			Method 1 - Limited Service Area		
Current LGU Population (excluding seasonal population of up to 10,000 persons):			2,315		
Current Sewershed Service Area Population:			2,315		
Percentage of LGU Population in County:			3.36%		
SDC Data Appendix Reference:			Appendix I		
County Name:			Rutherford		
Current Year County Population:			68,908		
Percentage of Service Area in LGU:			100.00%		
Year	State Data Center				
	County Population	LGU Population	Sewershed Service Area Population	Sewershed Service Area Population Including Seasonal Population of 7,678 Persons	
1	2020	69,105	2,322	2,322	10,000
2	2021	69,432	2,333	2,333	10,011
3	2022	69,759	2,344	2,344	10,022
4	2023	70,088	2,355	2,355	10,033
5	2024	70,415	2,366	2,366	10,044
6	2025	70,744	2,377	2,377	10,055
7	2026	71,071	2,388	2,388	10,066
8	2027	71,398	2,399	2,399	10,077
9	2028	71,725	2,410	2,410	10,088
10	2029	72,051	2,421	2,421	10,099
11	2030	72,379	2,432	2,432	10,110
12	2031	72,707	2,443	2,443	10,121
13	2032	73,033	2,454	2,454	10,132
14	2033	73,363	2,465	2,465	10,143
15	2034	73,687	2,476	2,476	10,154
16	2035	74,015	2,487	2,487	10,165
17	2036	74,344	2,498	2,498	10,176
18	2037	74,669	2,509	2,509	10,187
19	2038	74,998	2,520	2,520	10,198
20	2039	75,326	2,531	2,531	10,209
<i>If using an alternative source of data, provide a justification for use of this data below and provide supporting information in an appendix of the ER/EID.</i>					
Appendix Reference:		N/A			

3.2 Flow Projections

Flow projections for this project will span the next 20-years as this time frame is the expected design life for most projects, including the proposed project. The population projections determined in Section 3.1 will be used along with flow to calculate average daily flow and peak flow projections. The seasonal peaking factors (SPF) determined in Section 2.1.7 will be used to determine the seasonal flow variation of the 20 year population projections.

There are approximately 230 existing structures located along the lake front and an additional 215 structures that are located within the existing sewershed. These structures are not currently connected to the existing sewer system so they are assumed to be on septic. The 230 Tier 1 or lake front residences would be required to connect to the new sewer system as it becomes available. The additional 215 residences may connect but would not be required to connect to the new sewer system. Laterals will be installed to property lines to serve properties as the new subaqueous sewer system (SASS) is installed. The sewerred and septic parcels are shown in Figure 2.3A.

The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This includes the 230 Tier 1 or lake front residents. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

3.2.1 Collection System Rehabilitation

Rehabilitation projects will not include growth in the capacity of gravity sewer and/or force main that is to be rehabilitated. This proposed project involves the rehabilitation of existing

gravity sewer and force mains. As stated in Section 2.1.7, the current average daily flow collected by the existing Subaqueous Sewer System (SASS) within the sewershed area is 162,050 gpd. Table 3.2 below lists the projected future average daily flow and peak flow rates beginning the year the project begins (2020) through the 20-year project cycle. The projected average daily flow at the end of the 20-year project cycle (2039) is 183,612 gpd. The project peak flow at the end of the 20-year project cycle (2039) is 459,029 gpd. The seasonal flow variation for the current flow is 131,467 gpd to 229,351 gpd and for the projected flow is 328,667 gpd to 573,378 gpd. Appendix H includes supporting information for the flow calculations, including the peak flow calculations and seasonal flow variation.

Table 3.2. Future Peak Flow Analysis* Subaqueous Sewer System Replacement Town of Lake Lure	
Appendix Reference:	Appendix H
Current Flow Estimation Method:	North Carolina 2T Standards
Alternative Population Methodology Used?	No
Alternative Flow Projections Used?	No
Current Flow (gpd):	162,050
Year 20 Flow Projection Via Alternative Flow Projection Method:	N/A
Other Flow ^a (gpd) (if applicable):	0
Peaking Factor ^{**} :	2.5
Year 20 Average Daily Flow Projection (gpd):	183,612
Year 20 Peak Flow Projection (gpd):	459,029
<i>Provide a justification for the peaking factor utilized in this calculation.</i>	
This peaking factor has been calculated using the year 20 population as determined in Appendix H of this Engineering Report. This population was used in the peaking factor equation. This calculation can be found in Appendix H.	
^a May consist of Industrial or other known on-residential or non-commercial flow.	
[*] Flow projections prior to 2034 are not valid due to the increased reduction in I&I as future phases are complete.	
^{**} The peaking factor will be 2.5 after completion of the entire project in 2034.	

3.2.2 Wastewater Treatment Plant Equipment Repair and Replacement

In addition to establishing the current situation at the Plant, it is important to gain an understanding of the future situation at the Plant. All flow collected from the existing SASS is sent directly to the existing Plant. Based upon the data presented in Section 2.1.7, the Plant received and treated 162,050 gpd of wastewater. Table 3.3 below lists the projected future average daily flow rates beginning the year the project begins (2020) through the 20-year project cycle. The projected average daily flow at the end of the 20-year project cycle (2039) is 186,846 gpd. This total includes all residential and commercial flow. As there are no large industries within the Lake Lure Sewershed, there is no industrial flow to

account for. Appendix H includes supporting information for the flow calculations, including a peak flow calculation.

Table 3.3. Future Flow Analysis*					
Subaqueous Sewer System Replacement					
Town of Lake Lure					
		Current Flow (gpd):		162,050	
Year		SDC Data			
		Residential Flow (gpd)	Commercial Flow (gpd)	Industrial Flow (gpd)	Total Flow (gpd)
1	2020	662	99	0	162,811
2	2021	1,760	264	0	164,074
3	2022	2,859	429	0	165,338
4	2023	3,964	595	0	166,609
5	2024	5,063	759	0	167,872
6	2025	6,168	925	0	169,143
7	2026	7,267	1,090	0	170,407
8	2027	8,365	1,255	0	171,670
9	2028	9,464	1,420	0	172,933
10	2029	10,559	1,584	0	174,193
11	2030	11,661	1,749	0	175,460
12	2031	12,763	1,914	0	176,727
13	2032	13,858	2,079	0	177,987
14	2033	14,967	2,245	0	179,262
15	2034	16,055	2,408	0	180,514
16	2035	17,157	2,574	0	181,781
17	2036	18,263	2,739	0	183,052
18	2037	19,354	2,903	0	184,308
19	2038	20,460	3,069	0	185,579
20	2039	21,562	3,234	0	186,846
<i>If the alternative flow projection was the one accepted for use in the alternatives analysis, then provide a justification as to why the alternative flow projections are preferred over the flows developed based on SDC population projections.</i>					
There are no industries with the Lake Lure Shewershed and so there is no industrial flow.					
*Flow projections prior to 2034 are not valid due to the increased reduction in I&I as future phases are complete.					

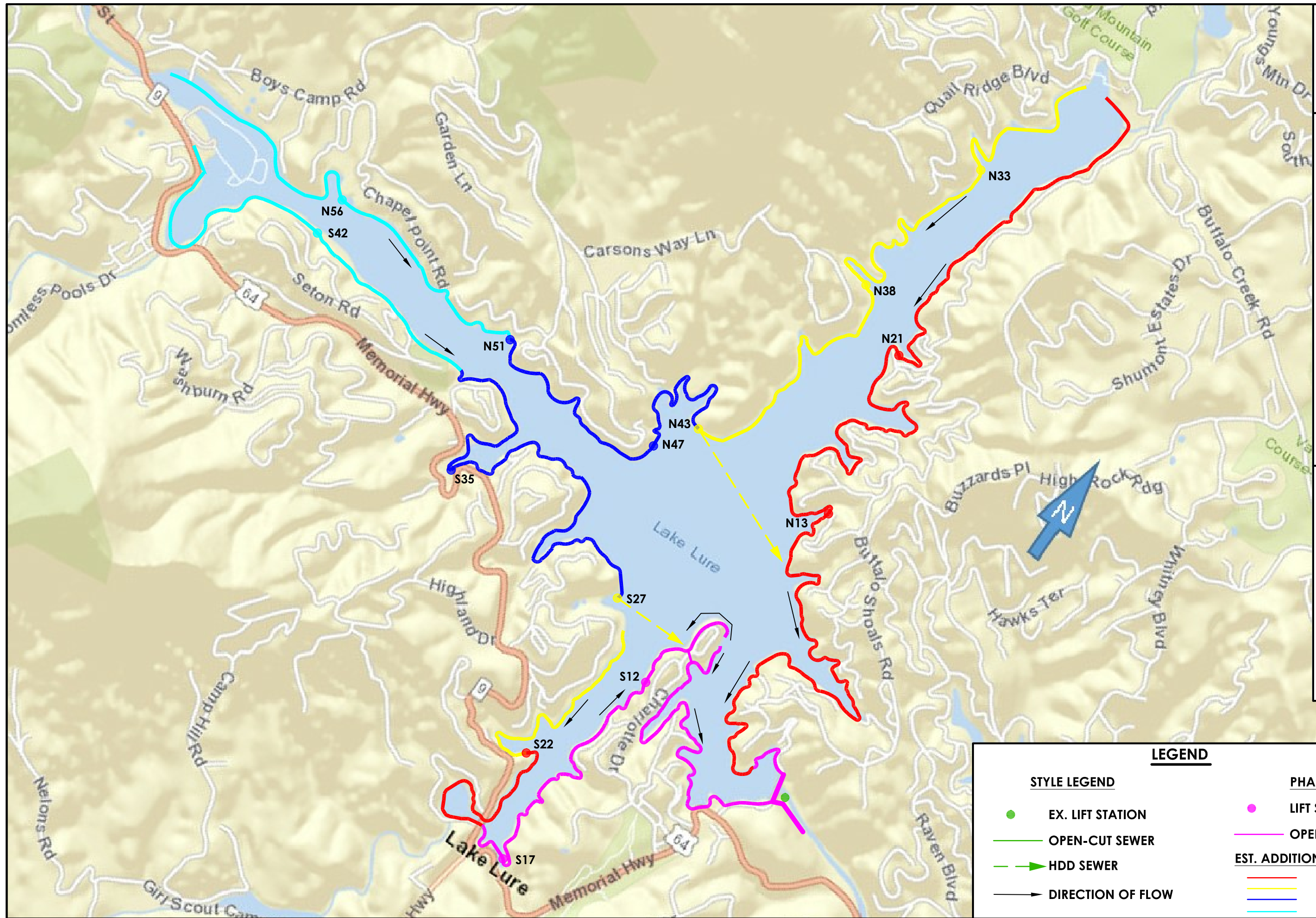
3.3 Future Project Phases

As mentioned in Sections 1.1 and 1.3.1 above, due to the magnitude of the issues with the existing wastewater collection system, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. It is proposed the overall project be completed in six (6) phases. Table 3.4 below

provides an estimated timeframe for future phases and lists the work proposed to be completed as part of those phases. Figure 3.1 provides an estimation of the proposed phase locations for the gravity lift sewer (GLS) installation.

Table 3.4. Future Phases Subaqueous Sanitary Sewer Replacement Town of Lake Lure		
Figure number for phase map:		3.1
Phase No.	Work to be Completed	Proposed Completion Date
1	Gravity Lift Sewer Installation, Manhole Rehabilitation, Wastewater Treatment Plant Rehabilitation	April 2024
2	Gravity Lift Sewer Installation	April 2026
3	Gravity Lift Sewer Installation	April 2028
4	Gravity Lift Sewer Installation	April 2030
5	Gravity Lift Sewer Installation	April 2032
6	Wastewater Treatment Plant IFAS Conversion	April 2034

This Engineering Report/Environmental Information Document (ER/EID) describes the proposed construction associated with Phase 1 only. If sources used to fund Phases 2 through 6 require an ER/EID, one will be written for each future phase. All future phases will require additional environmental review prior to construction regardless of the funding source requirements.



Town of Lake Lure
 GLS Phase Map



LEGEND

STYLE LEGEND		PHASE 1	
	EX. LIFT STATION		LIFT STATION
	OPEN-CUT SEWER		OPEN-CUT SEWER
	HDD SEWER	EST. ADDITIONAL PHASES	
	DIRECTION OF FLOW		

3.4 Future Project Phase Financing

As mentioned in Sections 1.1 and 1.3.2, due to the magnitude of the issues with the existing wastewater collection system, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. Table 3.3 in Section 3.3, provides an estimated timeframe to complete those phases, however, an additional component to completing the future phases is the financing of those phases.

The financial plan to fund Phase 1 and all future phases proposes three (3) significant increases in sewer rates along with the application of an annual inflation estimate of 3.5% to meet the anticipated debt service requirements within the ten-year horizon. The first significant increase of 30% has already been implemented in fiscal year 2020 and will cover the initial State Revolving Fund (SRF) loan of \$12.5M. This first sewer increase has been presented to the Town of Lake Lure (Town) residents via a community forum that is available for public review in the Town's website. The current Town budget is structured to immediately assume the expected debt service of Phase 1 design and construction.

The first SRF loan will source revenue for infrastructure that directly services existing sewer customers. After completion of each phase of construction, there is an opportunity to leverage sewer capacity to assume new customers that will provide additional cash reserves through sewer development fees and increased cash flow through expanded sewer user or availability fees. In keeping with North Carolina State Statutes, the Town intends to mandate the connection of all residential and commercial sewer effluent to the new system when available. This mandate generally extends to all existing and potential customers that have lakefront access and sewer service available.

To fund future phases, it is anticipated to raise the sewer rates in two (2) steps by 20% each time. While current sewer rates for the Town are among the top rates for North Carolina municipalities, subsequent significant increases are feasible, but will cause rates to significantly exceed the sewer rate norms of the State. The Town has therefore provided a framework of other options to fund subsequent design and construction phases to mitigate the sole dependence on the sewer and water fund.

The University of North Carolina School of Government, Environmental Finance Center describes a methodology to impose sewer development fees to new customers based of the relatively new North Carolina State Statute 162A Article 8 (imposed in 2018 and

referred to as Article 8) that authorizes municipalities to charge fees for wastewater service using an approved method to perform a supporting analysis. For the Town of Lake Lure (Town), that methodology generally would set rates consistent with the size of living space for the new customer. In addition, once a phase becomes operational and a service lateral becomes available to non-existing customers, North Carolina Statutes provide municipalities with an option to charge Availability Fees as an incentive to configure septic or other systems into the new sewer. The Town intends to exercise that option. It is estimated that the number of potential new customers will expand the customer base by up to 50% within each phase. Sewer Development Fees and Availability Fees would provide a significant and immediate source of new revenues to form a capital reserve and increase cash flow to source follow-on phases of design and construction.

The Town of Lake Lure will also pursue additional sources of revenue from grants (as they become available) and the Town's general fund, sourced from ad-valorem taxes. In general, the Town recognizes that sewer infrastructure should be sourced from sewer user fees, but the Town is seeking the authority through Special State legislation to apply ad-valorem revenues to this project. The basis for the legislation is founded on the principle that the health and prosperity of all Lake Lure residents is centered on the Lake itself. The new sewer infrastructure significantly protects the Lake water quality and enhances the current and projected value of all properties within the town boundaries. It is therefore reasonable to link property taxes at large to a portion of the revenue sourcing for the sewer infrastructure. This will allow the Town to leverage all property owners, rather than limiting the sourcing only to current users, to fund subsequent phases.

The combined effect of new sewer development revenue, imposition of availability fees, application of general fund dollars, payoff of previous debt service, and increased operational efficiencies as the new system becomes operational over the next ten years will mitigate the need to raise sewer rates to unprecedented levels.

Section 4.0 Purpose and Need

In order to evaluate a project, the purpose and need for the project must be identified. Funding for infrastructure is limited so it is important to maximize the positive impact of each dollar spent. A thorough description of the purpose and need for the project allows for a thorough evaluation.

4.1 Analysis of the Current and Future Situation

As discussed in Section 2.0, the proposed project involves the rehabilitation and/or replacement of the existing SASS and WWTP and includes the construction of a new gravity lift sewer system, rehabilitation of existing manholes, sewer access valve, and a WWTP rehabilitation. The existing SASS is at the end of its service life and at risk of a catastrophic failure that would result in a continuous SSO that would continue for an undetermined length of time. The WWTP has a long history of non-compliance compliance and the current process is not capable of meeting the conditions of the NPDES permit.

To summarize the problem statement, the main problem with the town of Lake Lure's wastewater system is that the lake infiltration from the submerged sewer collection dilutes the wastewater and prevents NPDES compliance. The original design intent in the 1920s was to utilize lake water to flush the system and then discharge everything downstream without treatment. Today the standards for handling wastewater have changed significantly and 100% of that which is in the collection and conveyance system must be treated with no exception.

4.2 Need Statement

The SASS and WWTP need replacement and rehabilitation to support current and expected growth in and around the project area and to provide for current and long term regulatory compliance. The SASS allows lake infiltration to the extent that a biological process to treat the wastewater is not possible. As a result, both the SASS and WWTP have a long history of violations and failures.

4.3 Purpose Statement

The purpose of this project will replace the SASS infrastructure and provide a dependable long life wastewater collection system with significantly reduced flows from the service area while relieving stress on the existing infrastructure and ensuring dependable wastewater and treatment collection. The reduced flows will allow the WWTP to be converted to and sustain a biological process designed to meet the NPDES permit limits. Due to the high capital cost associated with this project, it will be constructed in phases depending on the amount and timing of available funding.

4.4 Correlation of the Need to the Purpose

This project will replace the failing SASS with a robust, accessible, and maintainable system. This will reduce the risks of catastrophic failure and future SSO's, but removing the lake water from the system. This will also reduce the dilution of the wastewater and allow for a sustainable biological process. The WWTP needs to be converted from the existing physical chemical process to a biological process to enable NPDES compliance.

Section 5.0 Alternatives Analysis

5.1 Alternatives Description

The existing sanitary sewer infrastructure requires updates and enhancements to support expected growth in and around the project area and relieve stress on the older and/or failing infrastructure. The following provides an analysis of the alternatives considered in determining the best course of action to take support expected growth in and around the project area and relieve stress on the older and/or failing infrastructure.

5.1.1 No-Action Alternative

The No-Action Alternative must always be considered when evaluating the expenditure of public money. This no-action alternative would continue to operate the existing system without any changes or improvements. Table 5.1.1 summarizes the No-Action Alternative.

Table 5.1.1 Alternatives Description: Alternative I Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure			
No Action Alternative Description			
This no-action alternative would continue to operate the existing system “as-is” without any changes or improvements. No additional action will be taken beyond the current operation and would utilize the Subaqueous Sewer System (SASS) and Wastewater Treatment Plant (Plant) indefinitely.			
Is Figure Included? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		If yes, Figure Number: N/A	
Alternative Feasibility:		<input type="checkbox"/> Feasible <input checked="" type="checkbox"/> Infeasible	
Capital Cost: \$0		Present Worth: \$0	
Water Use, Reuse, Recapture, and Conservation			
<input checked="" type="checkbox"/>	The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.		
Energy Conservation			
<input checked="" type="checkbox"/>	The project type is not applicable to energy conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.		

**Table 5.1.1 Alternatives Description: Alternative I
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

The project type is applicable to energy conservation. The analysis is briefly discussed below.

Environmental Impact Description

The SASS is nearly 100 years old and is deteriorating. It is nearing the end of its service life and shows an increase in flow that is not related to growth in the sewer shed, but related to the continued deterioration of the SASS. The flow rate will continue to increase and will result in an increase in the frequency of SSOs and NOV's at the dam pump station and WWTP. The SASS is a high risk asset with a high probability and consequence of failure. A failure in the line will result in a continuous high flow event at the dam pump station that would lead to an SSO and result in a "No Flush" order for the town of Lake Lure and the contributing systems of Chimney Rock Village and Rumbling Bald. Due to the inaccessibility of the SASS and lack of precise information of its location, this condition would continue for an extended period of time. The high risk associated with this asset cannot be mitigated or reduced without the complete replacement of the SASS. The lake infiltration from the SASS dilutes the wastewater to the point that biological treatment is not possible. This resulted in the conversion of the WWTP from a biological process to a physical chemical process (P/C). The P/C process is incapable of meeting the NPDES limits, so the continued use of the SASS will result in NOV's at the WWTP.

The WWTP is nearly 51 years old and has a number of structures that are in need of rehabilitation. In addition, as described above the P/C process cannot meet the NPDES limits. This condition will continue until the WWTP is rehabilitated and utilizes a biological process. The WWTP will continue to deteriorate and continue to fail to meet the NPDES limits until the SASS is replaced and the WWTP rehabilitated.

The recommended alternative would reduce the lake infiltration and allow for a biological treatment process. It would also eliminate the risk associated with a failure of the SASS. The recommended alternative would prevent the SSOs and NOV's that would result in the continued use of the current collection and treatment systems.

Environmental Impact Analysis

- Greater than Preferred Alternative
- Less than Preferred Alternative
- Same as Preferred Alternative
- Preferred Alternative

Alternative: Accepted Rejected

Rationale for Acceptance/Rejection

This alternative is rejected as it would increase the number of SSOs and NOV's in the future and would eventually result in a catastrophic failure of the SASS. This failure would require the collection system for the Town the shut down and would cause a continuous and uncontrolled SSO for an undefinable period of time.

5.1.2 Subaqueous Sanitary Sewer (SASS) Alternatives

5.1.2.1 Backshore Gravity/Lift Stations Alternative (Preferred)

This Backshore Alternative collects all existing flows via a network of gravity-flowing sewers that essentially parallel the entire 19+ miles of Lake Shoreline. These sewers include HDPE manholes and HDPE pipe, all designed for 100% long-term elimination of infiltration (see Figure 5.1). Sewer manholes are spaced less than 1,000 linear feet of main apart from each other to allow for jet cleaning and televising as may be warranted from time to time. Sewer mains between manholes are laid at minimum slopes, but unlike conventional sewers, the mains follow the approximate curvature of the shoreline, using HDPE pipe bending radiuses down to the minimum recommended by the pipe's manufacturer. Depending on the sewer pipe size and the invert elevation of the most upstream manholes, this system can continue downstream as a gravity sewer system for several thousand feet up to a mile or more before the manhole and pipe depth reaches a limit. The limit is driven by the elevation to which the lake will be lowered to accommodate construction, which the Town is anticipating will be approximately 20-feet.

Service laterals will be installed from the main (via an HDPE fusion process to preclude infiltration) to every other adjacent property line, from which the parcels on either side will be served. The only expense to each property owner is re-direction of their existing service lateral to the new lateral, which will be located at either their waterfront left or right property corner. The Town-installed laterals will need to be located in an easement, which may be as small as 5-foot square, straddling the property lines that terminate at the water's edge.

In the Backshore Gravity/Lift Stations Alternative, the above-described Backshore system is augmented with simplex 'Lift' Stations at each depth-limited manhole (see Figure 5.2). A pump in each Lift Station raises the flow from the manhole's invert to a high-level outlet (containing a check valve to prevent backflow), which is the beginning of a subsequent stretch of gravity sewer system. The first segment of pipe downstream of each Lift Station is designed primarily to accept the pumped flow and so it is sized in coordination with the pump's capacity to achieve two-foot-per-second cleansing velocities and laid with matching inverts leaving the Lift Station and entering the next downstream manhole.

Every pump station will be provided with a stand-by generator. Provisions for pump failure at any single Lift Station is made by also sizing the first downstream pipe segment to convey – by gravity – the flows that would be received from the system upstream of the

Lift Station. Should a pump fail, the level in the Lift Station would rise, first triggering a high water alarm to alert maintenance staff, and then continuing to rise until the outlet is reached. At this point, flows would begin to convey downstream by gravity, bypassing the pump station but surcharging the gravity sewer segments upstream to the next upstream Lift Station's check valve. The design elevations of the Lift Station outlets accommodate peak gravity flows (given by the Engineer's conservative peaking formula $Q_{p(mgd)}=3.5Q_{a(mgd)}^{0.807}$) while maintaining a minimum two feet of freeboard at every manhole.

Phase 1 of this Alternative (the portion that can be addressed with the available SRF funds) begins at the lake's dam and runs along the north shoreline for approximately 8,500 linear feet and the south shoreline for approximately 7,000 linear feet. This first Phase is not expected to include any lift stations, and it will eliminate reliance on the existing system for all properties immediately adjacent to the Phase 1 construction. Table 5.1.2 summarizes the Backshore Gravity/Lift Stations Alternative and Figure 5.3 illustrates the pipe and Lift Stations network envisioned for this Alternative.

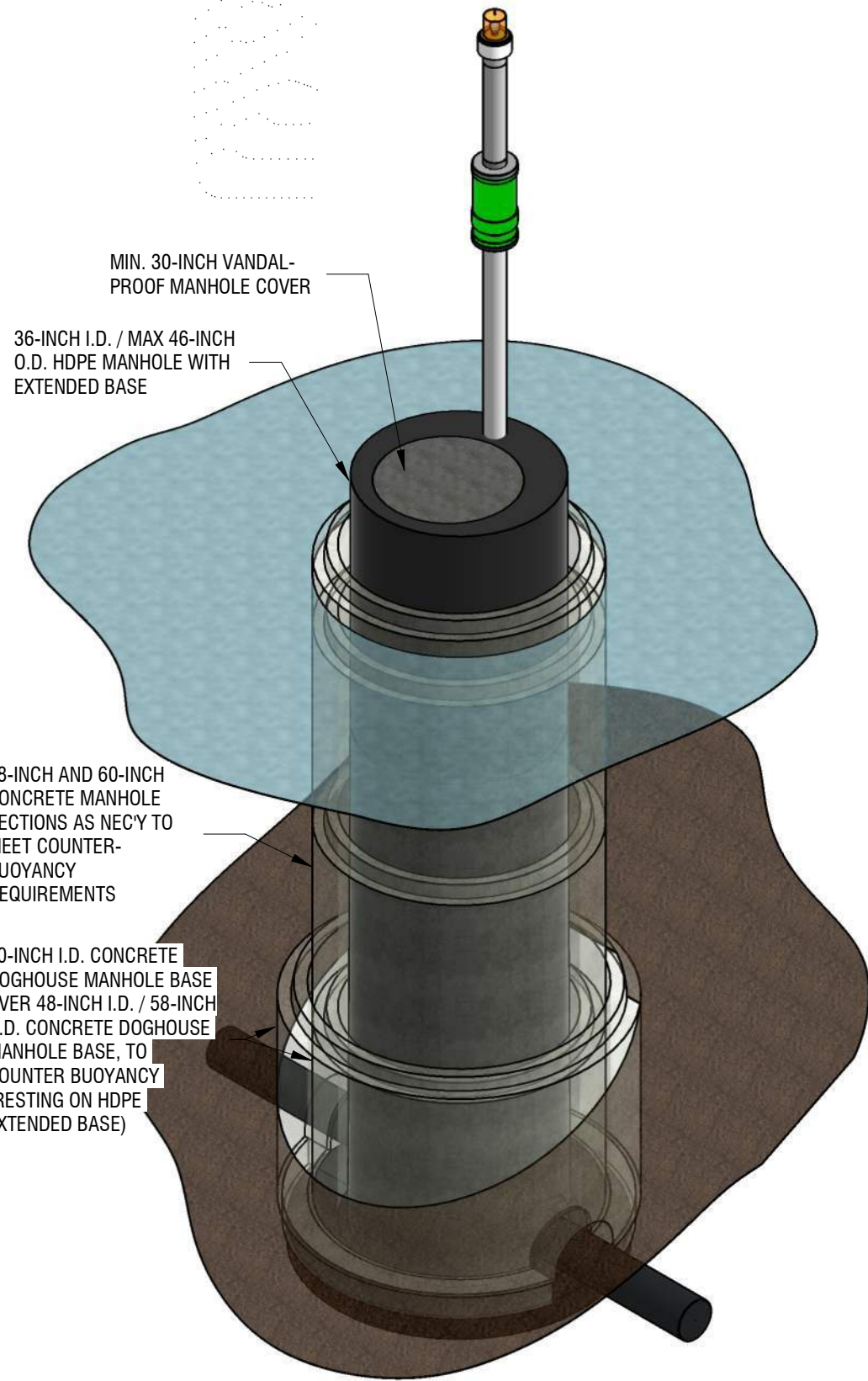
Table 5.1.2. Alternatives Description: Alternative II Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure			
Backshore Gravity/Lift Stations Alternative Description			
All 'Backshore' alternatives include the Sewer Access Valve, which enables construction to occur 'in the dry'. All Backshore alternatives also ultimately include approximately 101,000 linear feet of HDPE sewer main and approximately 110 manholes, a portion of which would be pump stations. In the Backshore Gravity/Lift Stations Alternative, there are ultimately 15 lift stations anticipated along the shoreline.			
Phase 1 (the portion that can be addressed with the available SRF funds) includes approximately 2,000 linear feet of 16-inch HDPE gravity sewer and 13,500 linear feet of 14-inch HDPE gravity sewer, and approximately 20 HDPE manholes. These sewers will extend from their respective dam penetration points (at an anticipated invert elevation of 970.0) along their respective shorelines until reaching an invert elevation of approximately 988.0, which is the highest anticipated invert elevation in the ultimate system. No lift stations are anticipated in Phase 1.			
Is Figure Included?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, Figure #:	Figure 5.1 thru 5.3
Alternative Feasibility:		<input checked="" type="checkbox"/> Feasible <input type="checkbox"/> Infeasible	
Capital Cost:	\$56,395,285	Present Worth:	\$57,378,932

Table 5.1.2. Alternatives Description: Alternative II	
Lake Lure Subaqueous Sanitary Sewer Replacement	
Town of Lake Lure	
Water Use, Reuse, Recapture, and Conservation	
<input checked="" type="checkbox"/>	The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.
<input type="checkbox"/>	The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.
<input type="checkbox"/>	The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.
Energy Conservation (CWSRF funded and co-funded projects only)	
<input checked="" type="checkbox"/>	The project type is not applicable to energy conservation. Therefore, no analysis has been completed.
<input type="checkbox"/>	The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed.
<input type="checkbox"/>	The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.
<input type="checkbox"/>	The project type is applicable to energy conservation. The analysis is briefly discussed below.
Environmental Impact Description	
<p>In order to construct any of the 'Backshore' Alternatives, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the sewer installation. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction.</p> <p>Long-term, this alternative is judged to have the greatest potential for reducing environmental risks associated with sewerage the properties adjacent to the lakeshore. All Backshore alternatives serve these properties by gravity, eliminating the risks of failure of the hundreds of pump stations that would otherwise be required downslope of each home towards the lakeshore, and all Backshore alternatives eliminate the existing aged subaqueous manholes and sewers that currently carry significant failure risk. The Backshore Gravity/Lift Stations Alternative has the further benefit of conveying those sewage flows largely by means of gravity, and minimizing the number of potential failure points. Even a pump failure would not result in an overflow, as the gravity-carrying capacity of the daisy-chained system would allow bypass of any particular pump station (only the simultaneous failure of two consecutive pump stations would be expected to potentially result in an overflow).</p>	
Environmental Impact Analysis	
<input type="checkbox"/>	Greater than Preferred Alternative
<input type="checkbox"/>	Less than Preferred Alternative
<input type="checkbox"/>	Same as Preferred Alternative
<input checked="" type="checkbox"/>	Preferred Alternative
Alternative: <input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected	

Table 5.1.2. Alternatives Description: Alternative II Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure
Rationale for Acceptance/Rejection
The Backshore Gravity/Lift Stations Alternative carries the lowest cost, when compared with the various alternatives that eliminate the existing subaqueous sewer system. This alternative also has the greatest potential to minimize failure risks leading to sewer discharges to the lake, as it has the fewest pumps and the simplest configuration of mechanical components, resulting in the lowest energy cost and operation and maintenance requirements. It also has the least impact on directly-connected property owners.

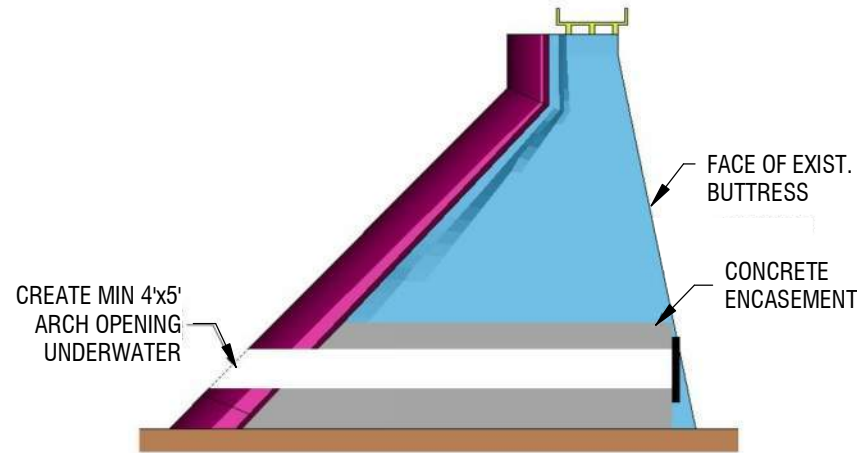
5.1.2.1.1 Future Project Phases

As mentioned in Section 3.4, due to the magnitude of the issues with the existing wastewater collection system, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. It is proposed the overall project be completed in six (6) phases. Phase 1 involves construction of some of the gravity lift sewer system, manhole rehabilitation, and work to rehabilitated portions of the Plant and is anticipated to be completed by April 2024. Phases 2 through 5 involve the construction of the rest of the gravity lift sewer system. Each phase is anticipated to take 2 years to complete with Phase 5 ending by April 2032. With the completion of Phase 5 in 2032, all of the existing SASS will have been replaced. Phase 6 involves the complete IFAS conversion of the Plant and is anticipated to be completed in April 2034.



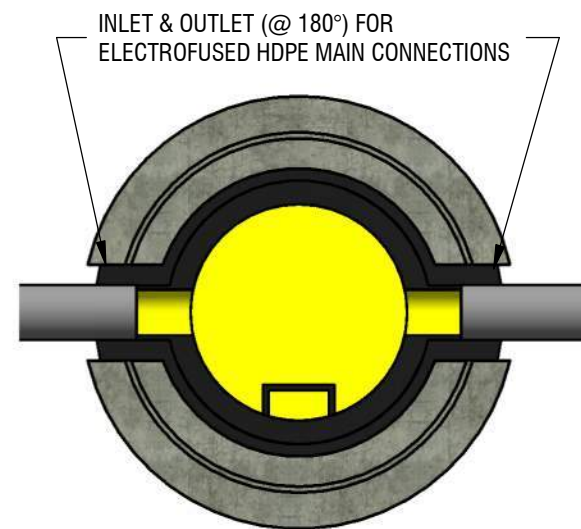
4 36" MANHOLE ISO VIEW

5.1.2.A



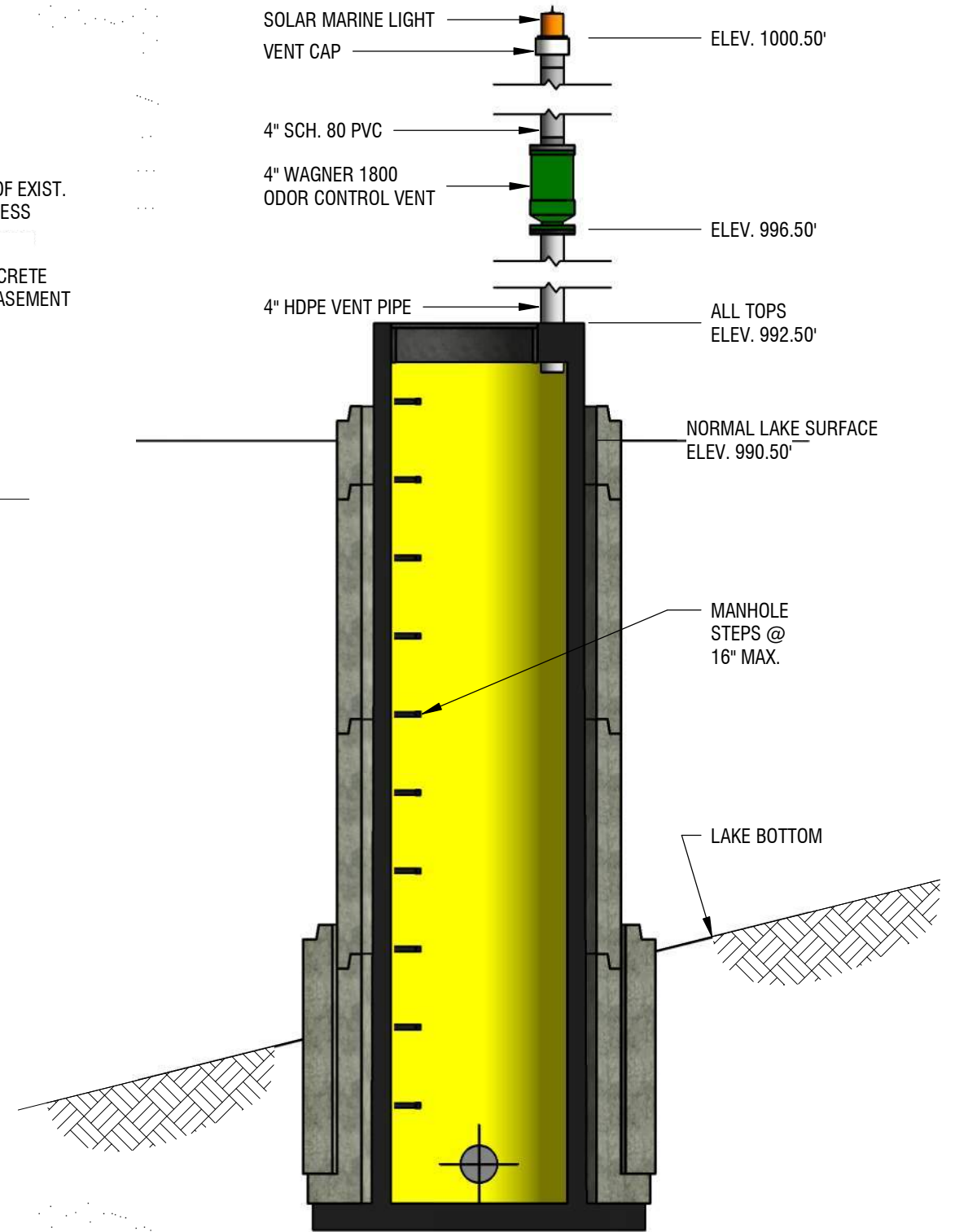
3 SEWER ACCESS VALVE

5.1.2.A NOT TO SCALE



2 36" MANHOLE FLOOR PLAN

5.1.2.A 3/8" = 1'-0"



1 36" MANHOLE SECTION

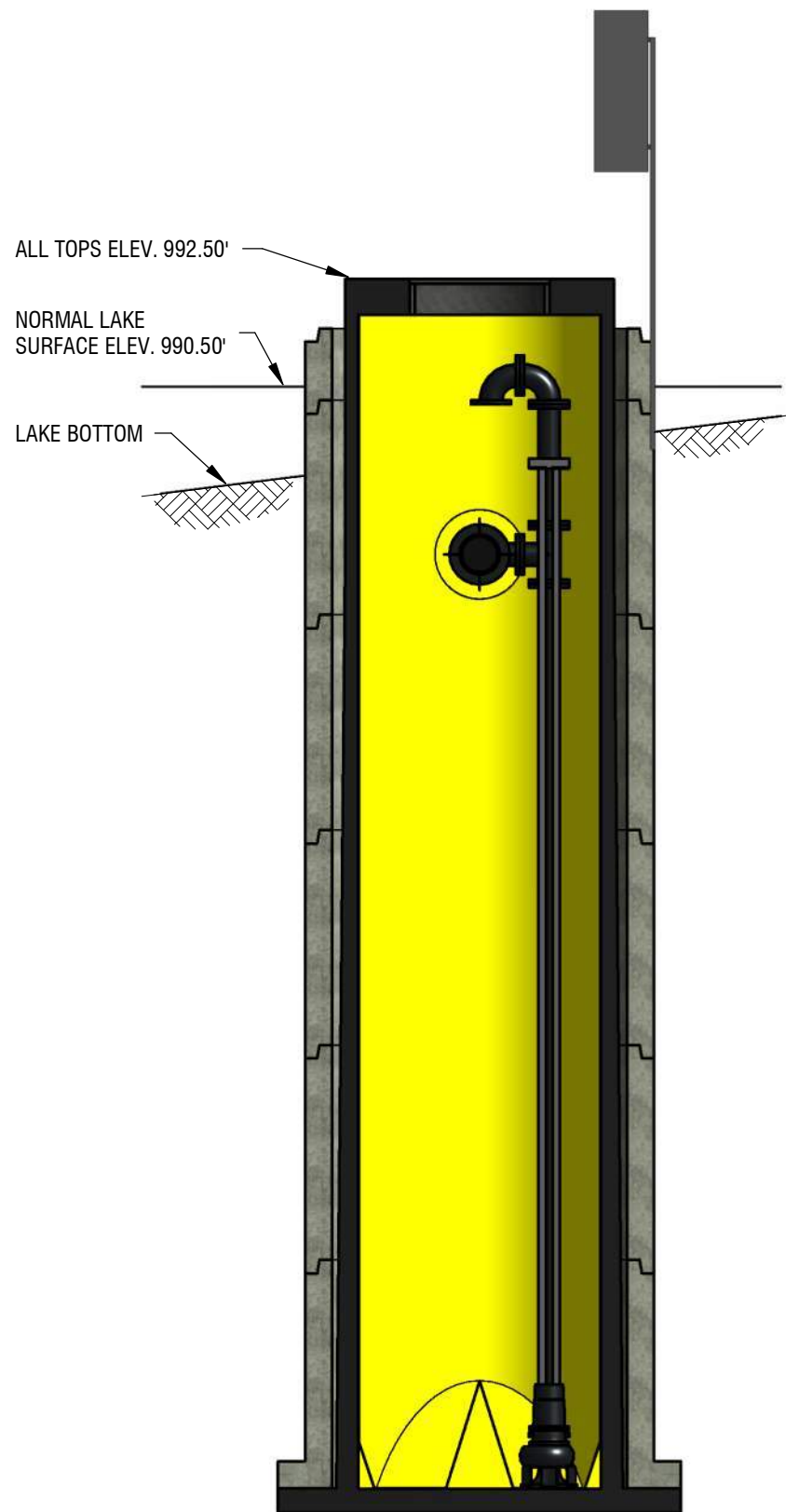
5.1.2.A 3/16" = 1'-0"

12/1/2020 10:22:59 AM

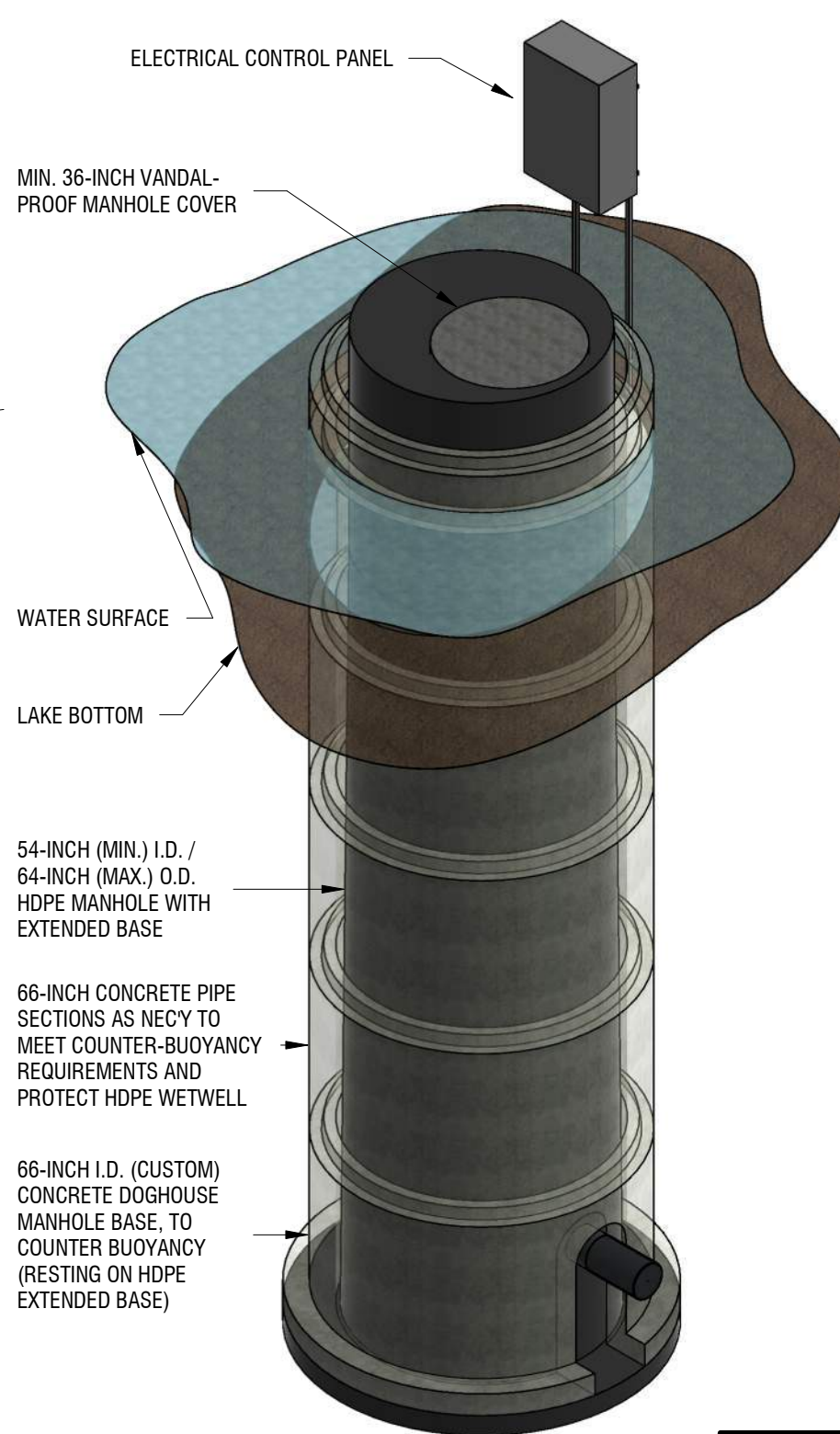
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400 S. Tryon Street, Suite 1300
Charlotte, NC 28285
704-376-6423
labellapc.com

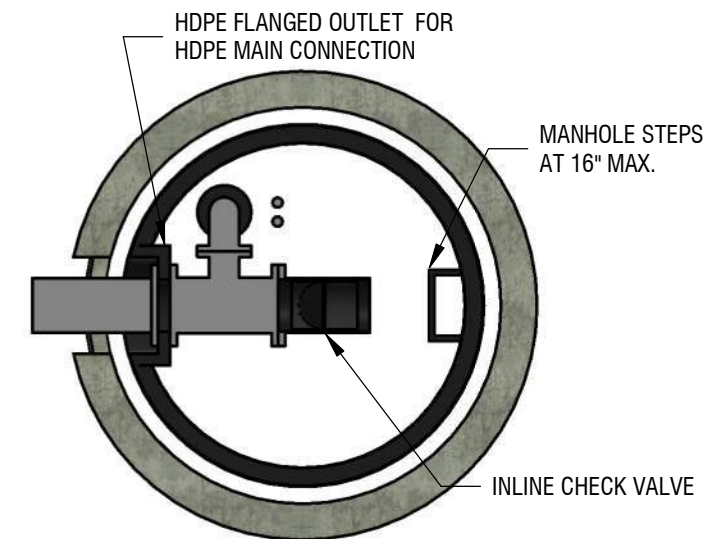
DRAWING NAME: BACKSHORE SEWER SYSTEM MANHOLES		ISSUED FOR: REVIEW	
PROJECT NAME: LAKE LURE SUBAQUEOUS SANITARY SEWER REPLACEMENT		DRAWN BY: JSB	DATE: 10/28/2020
		PROJECT NO.: 2200559	
		DRAWING NUMBER: FIGURE 5.1	



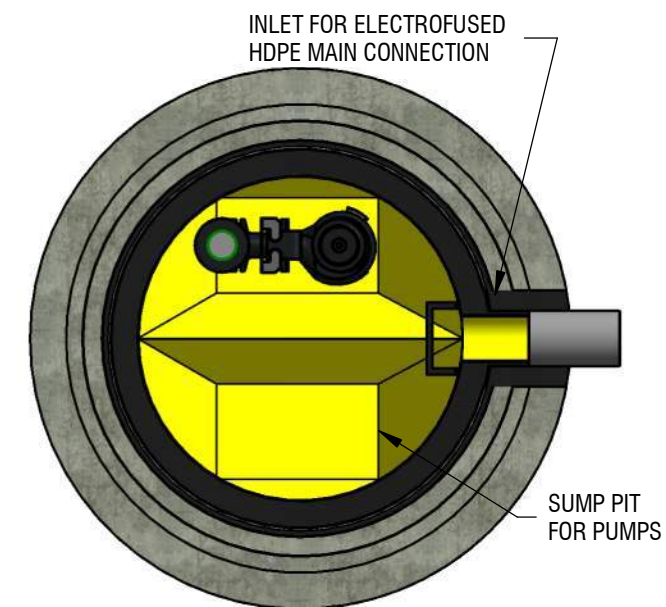
4 54" WETWELL SECTION
5.1.2.B 3/16" = 1'-0"



3 54" WETWELL ISO VIEW
5.1.2.B



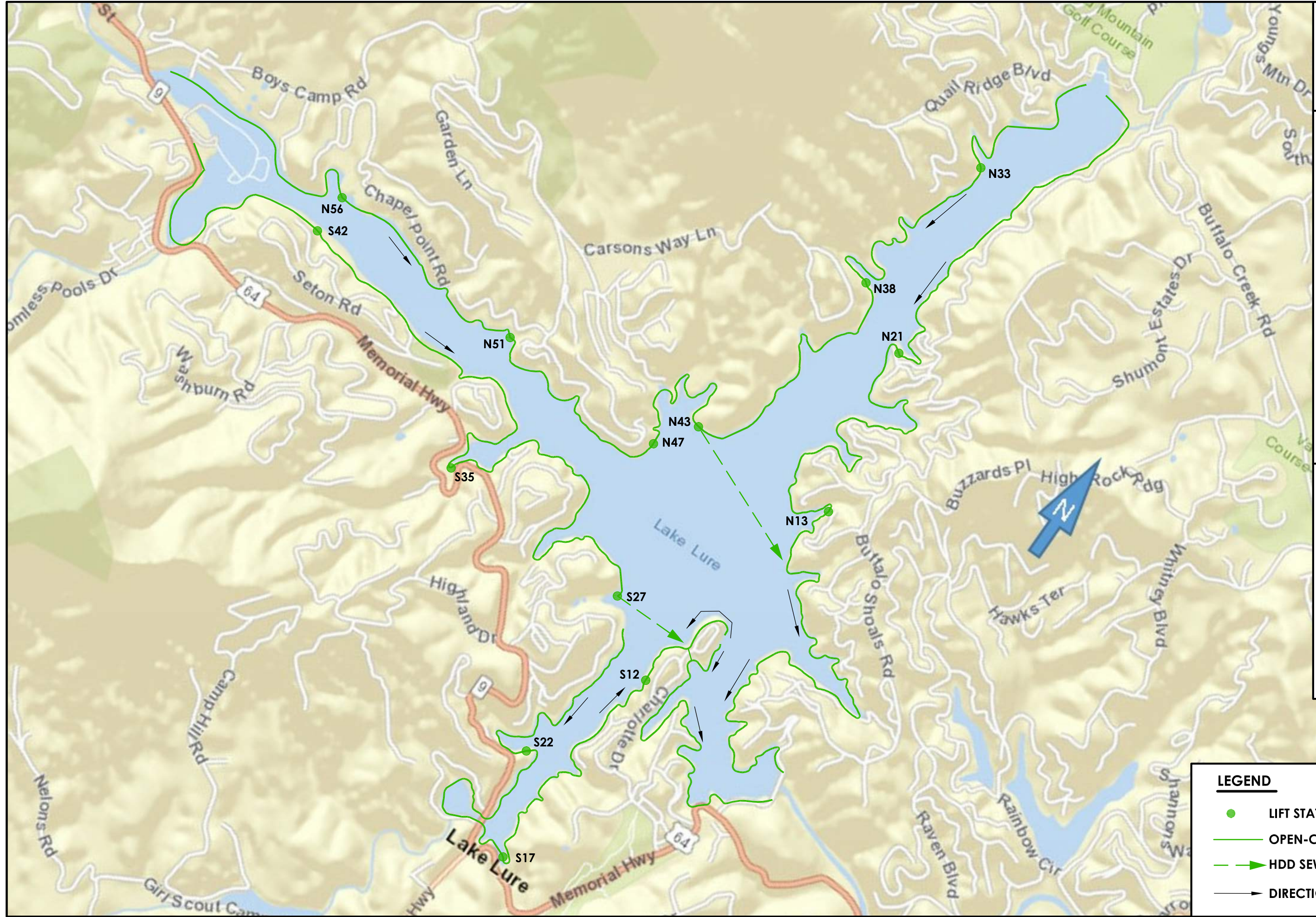
2 54" WETWELL SECTIONAL PLAN
5.1.2.B



1 54" WETWELL FLOOR PLAN
5.1.2.B 3/8" = 1'-0"

1/12/2021 2:21:34 PM

<p>LaBella Powered by partnership.</p> <p>400 S. Tryon Street, Suite 1300 Charlotte, NC 28285 704-376-6423 labellapc.com</p>	DRAWING NAME: BACKSHORE GRAVITY/LIFT SIMPLEX STATION (SUBMERSIBLE OPTION)		ISSUED FOR: REVIEW	
	PROJECT NAME: LAKE LURE SUBAQUEOUS SANITARY SEWER REPLACEMENT		DRAWN BY: JSB	DATE: 1/12/2021
			DRAWING NUMBER: FIGURE 5.2	



Project No. 2200569

FIGURE 5.3

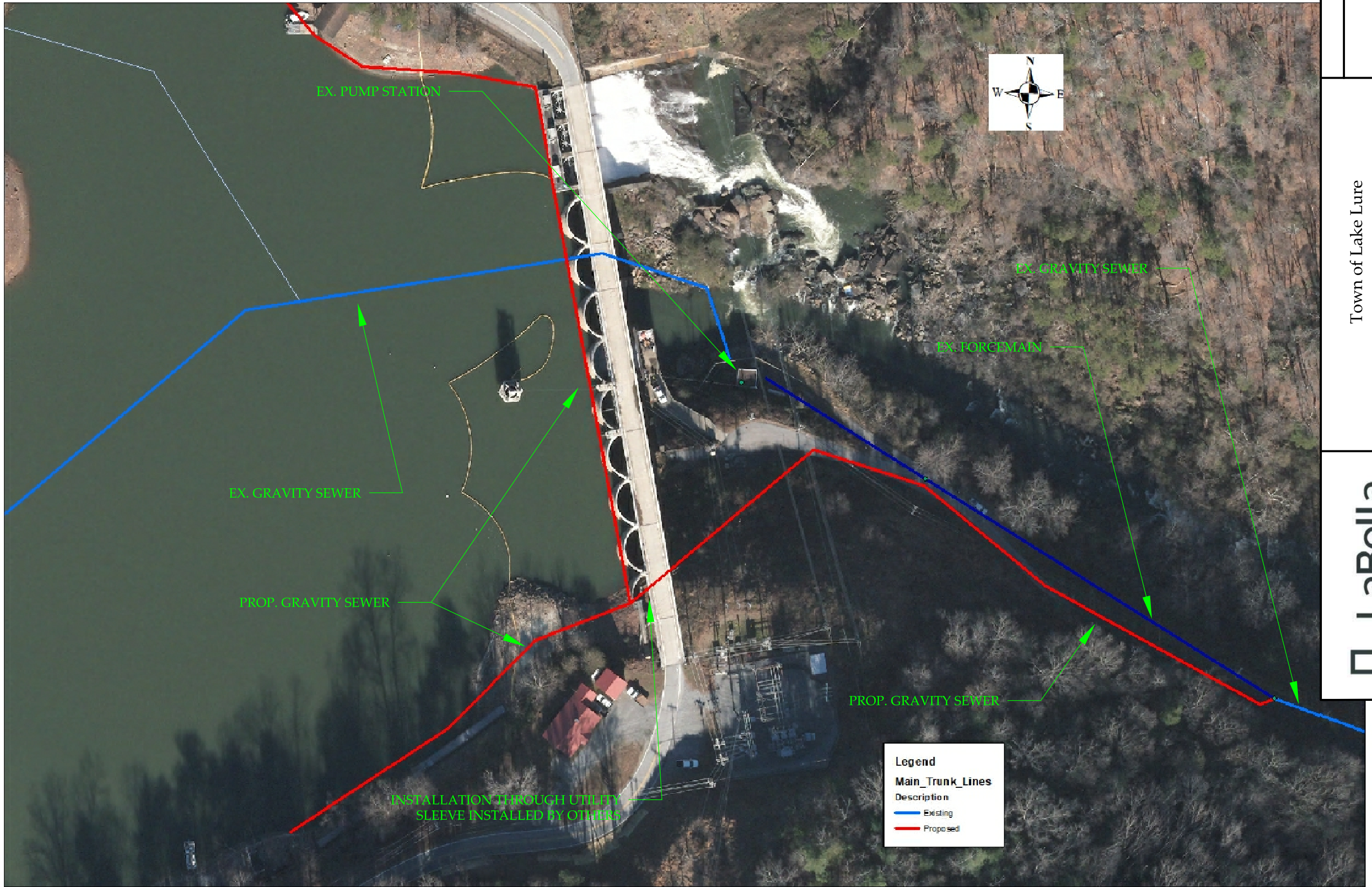
August 2020

Town of Lake Lure
Gravity / Lift Stations Option



LEGEND

- LIFT STATION
- OPEN-CUT SEWER
- ▶ HDD SEWER
- ▶ DIRECTION OF FLOW



EX. PUMP STATION

EX. GRAVITY SEWER

EX. FORCEMAIN

EX. GRAVITY SEWER

PROP. GRAVITY SEWER

PROP. GRAVITY SEWER

INSTALLATION THROUGH UTILITY SLEEVE INSTALLED BY OTHERS

Legend
Main_Trunk_Lines
 Description
 — Existing
 — Proposed



Town of Lake Lure
 Phase 1
 Dam Penetration and Ex. Sewer Connection

Figure 5.3A



Town of Lake Lure
Phase 1
Manhole Rehabilitation



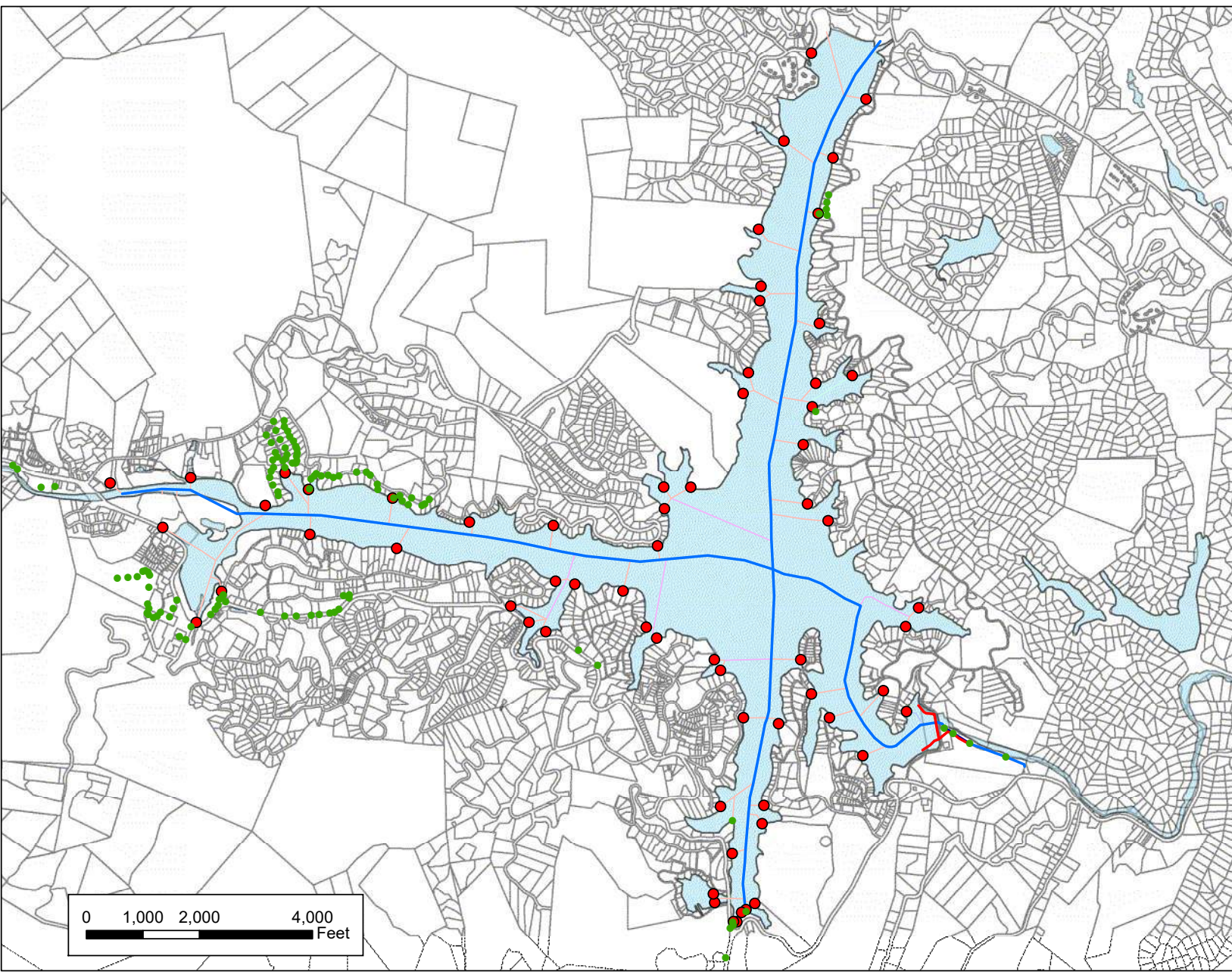
Legend

Manholes

Scope

- Out of Scope
- Phase 1

Figure 5.3B



5.1.2.2 Backshore Pump Stations Alternative

The Backshore Pump Stations Alternative employs many of the same gravity-flowing sewer components (19+ miles of HDPE sewers, manholes, and service laterals) as the Backshore Gravity/Lift Stations Alternative. However, pump stations in this second Backshore alternative take flows from the gravity system and pump them into a pressure pipe network that runs approximately parallel to the gravity system (in the same trench where feasible). The result is that very little of the gravity sewer pipe must be larger than 8-inch diameter, and the flowrates of the pump stations are all relatively low, since each one receives only the flows up to (but not beyond) the next upstream pump station. Due to the nature of the pressure pipe system, the pumps experience higher discharge pressure conditions, resulting in the stations furthest from the dam requiring greater horse power. On each of the north and south shores, the respective pressure network discharges into a gravity sewer as it approaches the dam, from which it then flows downstream entirely by gravity to the respective dam penetration points.

The first segment of gravity sewer 'downstream' of each pump station is designed primarily to receive flow from the service laterals between the pump station and the next gravity system manhole. However, to provide redundancy in case of a pump station failure, this gravity sewer (with a couple of exceptions) is also connected to the upstream pump station at a high level in the wet well. Should a pump fail, the level in the upstream Lift Station would rise, first triggering a high water alarm to alert maintenance staff, and then continuing to rise until the outlet is reached. At this point, flows would begin to convey downstream by gravity, bypassing the pump station but surcharging the gravity sewer segments upstream. The design elevations of the sewers accommodate peak gravity flows (given by the Engineer's conservative peaking formula $Q_{p(mgd)}=3.5Q_{a(mgd)}^{0.807}$) while maintaining a minimum two feet of freeboard at every manhole. For those pump stations where this condition would be reached in less than four hours under peak flows (given by the NCDEQ pump station peaking formula $(18 + \sqrt{P})/(4 + \sqrt{P})$), a duplex pump station is provided. The two pump stations located just upstream of the two horizontal directional drilled force main segments would also be duplex, since no downstream gravity sewer is connected. In addition, every pump station is provided with a stand-by generator.

Phase 1 of this Alternative (the portion that can be addressed with the available SRF funds) begins at the lake's dam and runs along the north shoreline for approximately 10,000 linear feet, and the south shoreline for approximately 9,000 linear feet. This first

Phase would include up to four (simplex) pump stations and the associated portions of the ultimate force main. It will eliminate reliance on the existing system for all properties immediately adjacent to the Phase 1 construction.

Because the Phase 1 force mains are at the portion of the network that will ultimately experience the greatest flows, they are sized for those ultimate flows. As a result, the amount of flow required to flush the force mains will be considerably higher than is required of the Phase 1 pump stations. Therefore, a flushing connection at the upstream termination of each (north and south) force main network is included. This can be flushed with lake water and a portable pump. In addition, the portion of the force main that is installed parallel to the gravity sewers upstream of the westernmost pump station will experience zero flow until subsequent phases are constructed, but this is installed as a closed pipe so that it does not receive wastewater until subsequent phases are installed. Table 5.1.3 summarizes the Backshore Pump Stations Alternative. Figure 5.4 illustrates the pipe and Lift Stations network envisioned for this Alternative.

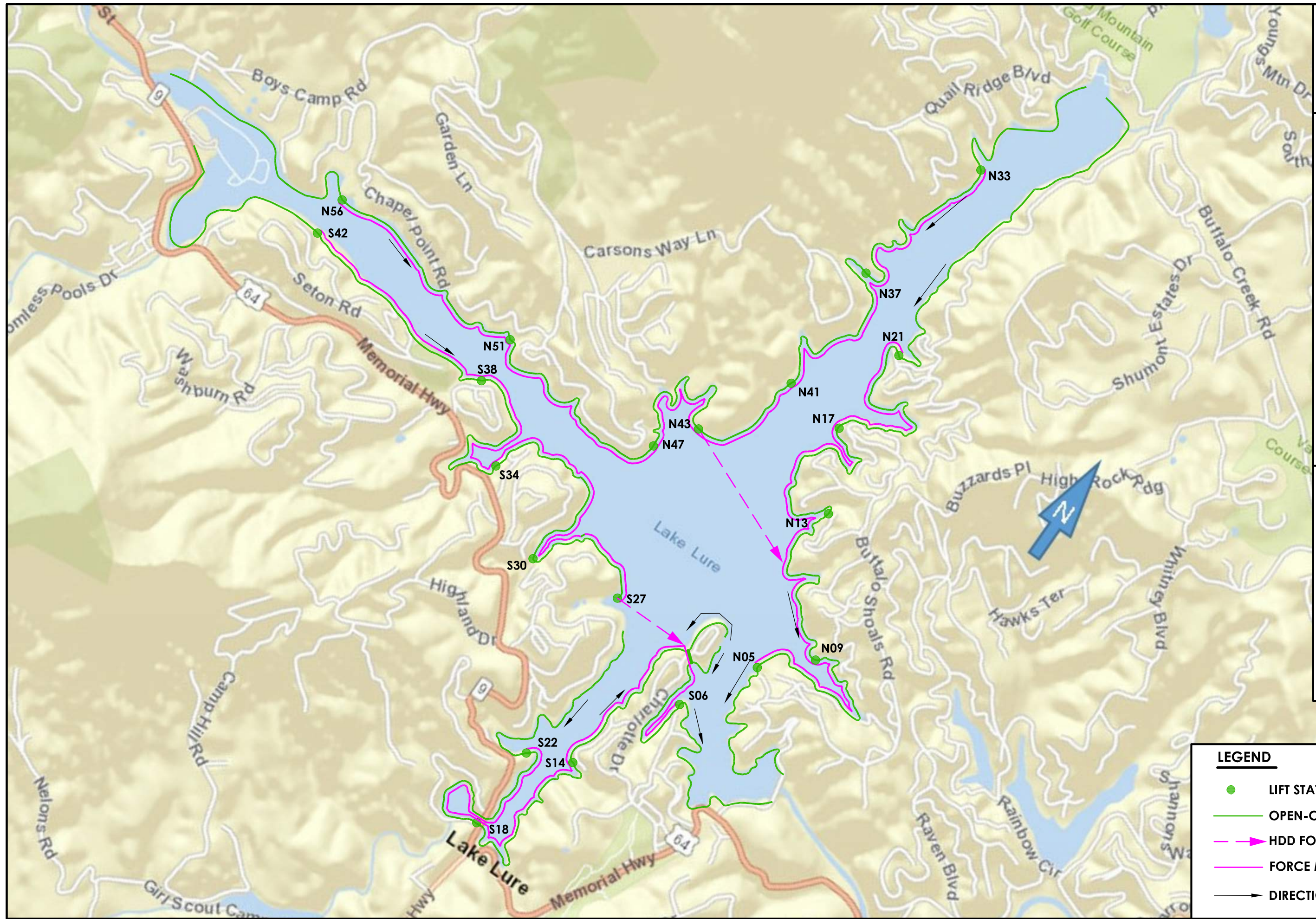
Table 5.1.3. Alternatives Description: Alternative III			
Lake Lure Subaqueous Sanitary Sewer Replacement			
Town of Lake Lure			
Backshore Pump Stations Alternative Description			
All 'Backshore' alternatives include the Sewer Access Valve, which enables construction to occur 'in the dry'. All Backshore alternatives also ultimately include approximately 101,000 linear feet of HDPE sewer main and approximately 110 manholes, a portion of which would be pump stations. In the Backshore Pump Stations Alternative, there are ultimately 22 pump stations anticipated along the shoreline.			
Phase 1 (the portion that can be addressed with the available SRF funds) includes approximately 6,200 linear feet of 12-inch HDPE gravity sewer and 13,400 linear feet of 8-inch HDPE gravity sewer, and approximately 17 HDPE manholes. These sewers will extend from their respective dam penetration points (at an anticipated invert elevation of 970.0) along their respective shorelines until reaching an invert elevation of approximately 988.0, which is the highest anticipated invert elevation in the ultimate system. At four locations where this high elevation is reached, a simplex pump station is included. Approximately 13,400 linear feet of 10-inch force main network parallels the 8-inch gravity sewer.			
Is Figure Included?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, Figure #:	Figure 5.1 and 5.4
Alternative Feasibility:		<input checked="" type="checkbox"/> Feasible	<input type="checkbox"/> Infeasible
Capital Cost:	\$61,694,469	Present Worth:	\$63,040,420

Table 5.1.3. Alternatives Description: Alternative III Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure	
Water Use, Reuse, Recapture, and Conservation	
<input checked="" type="checkbox"/> The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.	
Energy Conservation (CWSRF funded and co-funded projects only)	
<input checked="" type="checkbox"/> The project type is not applicable to energy conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is applicable to energy conservation. The analysis is briefly discussed below. <input type="checkbox"/> The project type is applicable to energy conservation. The analysis is briefly discussed below.	
Environmental Impact Description	
<p>In order to construct any of the 'Backshore' Alternatives, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the sewer installation. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction.</p> <p>Long-term, this alternative is judged to have a similar or slightly worse potential for reducing environmental risks associated with sewerage the properties adjacent to the lakeshore as the Backshore Gravity/Lift Stations Alternative. All Backshore alternatives serve these properties by gravity, eliminating the risks of failure of the hundreds of pump stations that would otherwise be required downslope of each home towards the lakeshore, and all Backshore alternatives eliminate the existing aged subaqueous manholes and sewers that currently carry significant failure risk. The Backshore Pump Stations Alternative has substantially more pipeline (due to the parallel pressure system) and nearly 50% more pump stations, introducing more potential points of failure. The pump stations themselves convey (on average) a substantially lower amount of flow each because they do not function primarily in a daisy-chained configuration, and this lowers the risk of each pump station, particularly given that most of them can function in a daisy-chain configuration in case of a pump failure.</p>	
Environmental Impact Analysis	
<input type="checkbox"/> Greater than Preferred Alternative <input type="checkbox"/> Less than Preferred Alternative <input checked="" type="checkbox"/> Same as Preferred Alternative <input type="checkbox"/> Preferred Alternative	
Alternative: <input type="checkbox"/> Accepted <input checked="" type="checkbox"/> Rejected	

**Table 5.1.3. Alternatives Description: Alternative III
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Rationale for Acceptance/Rejection

The Backshore Pump Stations Alternative carries a capital cost approximately 10% higher than the Backshore Gravity/Lift Stations Alternative (the Preferred Alternative), and a substantially higher operation cost owing not only to the higher number of pump stations, but also to the pressure conditions under which those stations operate. Notwithstanding the failure protections included in the design of this alternative, the Town prefers to rely on non-mechanical means of sewer conveyance to the greatest extent possible. The additional pump stations will also require additional associated generators, which will likely require property acquisition and easements, which the Town wishes to avoid to the greatest extent possible.



Project No. 2200569

FIGURE 5.4

August 2020

Town of Lake Lure
Backshore Pump Stations Option



LEGEND

- LIFT STATION
- OPEN-CUT SEWER
- - - HDD FORCE MAIN
- FORCE MAIN
- DIRECTION OF FLOW

5.1.2.3 Backshore Low Pressure Sewer System Alternative

The Backshore Low Pressure Sewer System Alternative employs individual grinder pump stations at each residence or tie location that pump into a common force main. It consists of approximately 19 miles of HDPE force main ranging from 2-inch to 10-inch diameter and 1112 individual grinder pump stations. There are larger traditional duplex pump station to handle the flow contribution from connecting systems and to pump under the lake to avoid pumping around the northern and southern leg of the system. On each of the north and south shores, the respective pressure network combines and penetrates the dam on the southern shore and discharges into the gravity sewer that flows to the wastewater treatment plant.

The flow rate is determined using the simplified equation ($Q=AN+B$) from EPA Alternate Wastewater Collection System Manual. This approach assumes a flow rate of 250 GPD per EDU and a peaking factor of 4. This equation is uses a probabilistic approach to determine the number of pumps running simultaneously. The force mains are sized based on the calculated flow and a minimum velocity of 2 ft/s. The pump stations for connecting systems were sized based on metered flow from those systems and a high level I&I determination. The flow was converted into ERUs and incorporated into the LPSS model. The two pump stations located just upstream of the two horizontal directional drilled force main segments would also be duplex, since no downstream gravity sewer is connected and is sized based on the accumulated ERUs from the upstream LPSS. The duplex pump stations include backup generation.

The grinder pump stations would be installed above the lake elevation and incorporating the system from each residence. The force main will be installed in the backshore area along the lower elevation provided by the sewer access valve to reduce changes in elevation and need for air release valves, as well as to minimize the interference of existing lake structures. Table 5.1.4 summarizes the Backshore Low Pressure Sewer System Alternative.

**Table 5.1.4. Alternatives Description: Alternative IV
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Backshore Low Pressure Sewer System Alternative Description

All 'Backshore' alternatives include the Sewer Access Valve, which enables construction to occur 'in the dry'. This alternatives includes approximately 101,400 linear feet of HDPE force main, 4 duplex pump stations, and 1,112 grinder pump stations.

Is Figure Included? Yes No **If yes, Figure #:** N/A

Alternative Feasibility: Feasible Infeasible

Capital Cost: \$56,653,509 **Present Worth:** \$71,128,231

Water Use, Reuse, Recapture, and Conservation

- The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.
- The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.
- The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.

Energy Conservation (CWSRF funded and co-funded projects only)

- The project type is not applicable to energy conservation. Therefore, no analysis has been completed.
- The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed.
- The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.
- The project type is applicable to energy conservation. The analysis is briefly discussed below.

Environmental Impact Description

In order to construct any of the 'Backshore' Alternatives, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the sewer installation. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet.

Long-term, this alternative is judged to have a worse potential for reducing environmental risks associated with sewerage the properties adjacent to the lakeshore as the Backshore Gravity / Lift Stations Alternative. This is primarily due to the significant reliance on pump stations and the risks of failure of the hundreds of pump stations that would otherwise be required downslope of each home towards the lakeshore, and all Backshore alternatives eliminate the existing aged subaqueous manholes and sewers that currently carry significant failure risk. The Backshore Low Pressure Sewer System Alternative has roughly the same amount of pipeline, although smaller in diameter. The main difference is the substantial increase in pump stations, introducing more potential points of failure.

Table 5.1.4. Alternatives Description: Alternative IV Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure	
Environmental Impact Analysis	
<input checked="" type="checkbox"/> Greater than Preferred Alternative <input type="checkbox"/> Less than Preferred Alternative <input type="checkbox"/> Same as Preferred Alternative <input type="checkbox"/> Preferred Alternative	
Alternative:	<input type="checkbox"/> Accepted <input checked="" type="checkbox"/> Rejected
Rationale for Acceptance/Rejection	
<p>The Backshore Low Pressure Sewer System Alternative carries a higher capital cost, than the Backshore Gravity / Lift Stations Alternative (the Preferred Alternative), and a substantially higher operation cost owing not only to the higher number of pump stations, but also to the pressure conditions under which those stations operate. Notwithstanding the failure protections included in the design of this alternative, the Town prefers to rely on non-mechanical means of sewer conveyance to the greatest extent possible. The additional pump stations increases the O&M cost and difficulties in maintaining and operating the system. The Town of Lake Lure is a resort community, as such many of the systems are not utilized year round. This intermediate use can add to the risk associated with pump failures. The grinder locations would also require a large number of right-a-ways to be acquired, which the Town is trying to minimize.</p>	

5.1.2.4 Land-Based Low Pressure Sewer System Alternative

The Land-Based Low Pressure Sewer System Alternative employs individual grinder pump stations at each residence or tie location that pump into a common force main. However the force main runs around the perimeter roads and drives and does not involve installation in the backshore area. It consists of approximately 28 miles of HDPE force main ranging from 2-inch to 6-inch diameter and 760 individual grinder pump stations. There are larger traditional duplex pump station to handle the flow contribution from connecting systems. On each of the north and south shores, the respective pressure network combines and penetrates the dam on the southern shore and discharges into the gravity sewer that flows to the wastewater treatment plant.

The flow rate is determined using the simplified equation ($Q=AN+B$) from EPA Alternate Wastewater Collection System Manual. This approach assumes a flow rate of 250 GPD per EDU and a peaking factor of 4. This equation is uses a probabilistic approach to determine the number of pumps running simultaneously. The force mains are sized based on the calculated flow and a minimum velocity of 2 ft/s. The pump stations for connecting systems were sized based on metered flow from those systems and a high level I&I

determination. The flow was converted into ERUs and incorporated into the LPSS model. The duplex pump stations include backup generation.

The grinder pump stations would be installed above the lake elevation and incorporating the system from each residence. The force mains will need to be installed by HDD to the roads and drives above each resident. The force main will be installed along the roads surrounding Lake Lure and will need air release valves at changes in elevation. Table 5.1.5 summarizes the Land-Based Low Pressure Sewer System Alternative.

Table 5.1.5. Alternatives Description: Alternative V	
Lake Lure Subaqueous Sanitary Sewer Replacement	
Town of Lake Lure	
Land-Based Low Pressure Sewer System Alternative Description	
All 'Backshore' alternatives include the Sewer Access Valve, which enables construction to occur 'in the dry'. This alternative includes approximately 147,000 linear feet of HDPE force main, 2 duplex pump stations, and 760 grinder pump stations.	
Is Figure Included? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes, Figure #: N/A
Alternative Feasibility: <input checked="" type="checkbox"/> Feasible <input type="checkbox"/> Infeasible	
Capital Cost: \$70,024,641	Present Worth: \$79,965,551
Water Use, Reuse, Recapture, and Conservation	
<input checked="" type="checkbox"/> The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.	
Energy Conservation (CWSRF funded and co-funded projects only)	
<input checked="" type="checkbox"/> The project type is not applicable to energy conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is applicable to energy conservation. The analysis is briefly discussed below. <input type="checkbox"/> The project type is applicable to energy conservation. The analysis is briefly discussed below.	
Environmental Impact Description	
In order to construct any of the 'Backshore' Alternatives, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the sewer installation. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the	

Table 5.1.5. Alternatives Description: Alternative V Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure	
same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet.	
Long-term, this alternative is judged to have a worse potential for reducing environmental risks associated with sewerage the properties adjacent to the lakeshore as the Backshore Gravity / Lift Stations Alternative. This is primarily due to the significant reliance on pump stations and the risks of failure of the hundreds of pump stations that would otherwise be required downslope of each home towards the lakeshore, and all alternatives eliminate the existing aged subaqueous manholes and sewers that currently carry significant failure risk. The Land-Based Low Pressure Sewer System Alternative has a greater amount of pipeline, although smaller in diameter. The main difference is the substantial increase in pump stations, introducing more potential points of failure.	
Environmental Impact Analysis	
<input checked="" type="checkbox"/> Greater than Preferred Alternative <input type="checkbox"/> Less than Preferred Alternative <input type="checkbox"/> Same as Preferred Alternative <input type="checkbox"/> Preferred Alternative	
Alternative: <input type="checkbox"/> Accepted <input checked="" type="checkbox"/> Rejected	
Rationale for Acceptance/Rejection	
<p>The Land-Based Low Pressure Sewer System Alternative carries a higher capital cost, than the Backshore Gravity / Lift Stations Alternative (the Preferred Alternative), and a substantially higher operation cost owing not only to the higher number of pump stations, but also to the pressure conditions under which those stations operate. This alternative serves fewer lots than the Backshore Gravity / Lift Alternative and cost more. Notwithstanding the failure protections included in the design of this alternative, the Town prefers to rely on non-mechanical means of sewer conveyance to the greatest extent possible. The additional pump stations increases the O&M cost and difficulties in maintaining and operating the system. The Town of Lake Lure is a resort community, as such many of the systems are not utilized year round. This intermediate use can add to the risk associated with pump failures. The grinder locations would also require a large number of right-a-ways to be acquired, which the Town is trying to minimize. In addition, the force main would need to be installed along roads and drives that are not currently maintained by the Town and on which there are no current right-of-ways. As a result, there would be substantial right-of-way acquisition to the point that this alternative is not considered feasible. The construction would also have to open cut NC highways for a significant length and represent a difficult and highly disruptive project to the population of the Town. A geotechnical investigation was conducted which indicated a substantial amount of rock excavation.</p>	

5.1.3 Wastewater Treatment Plant (Plant) Alternatives

All of the Wastewater Treatment Plant (Plant) Alternatives assume the Subaqueous Sewer System (SASS) has been replaced, are based on a size of 0.5 MGD, and assume the following characteristics: BOD₅ (250 mg/L), TSS (250mg/L), and Ammonia (30 mg/L). The

effluent limits are assumed to be current limits with the inclusion of winter time ammonia limits that are twice the summer limits. These assumptions are based on standard wastewater characteristics and are more consistent with what the wastewater treatment plant would likely encounter without the large amounts of lake infiltration. The SASS replacement would greatly reduce the risk of a continuous and uncontrolled flow rate for an indeterminate time period that would result from a failure in the SASS and would result in process failure of any wastewater plant alternative. As a result, the current plan is to replace the SASS prior the complete wastewater treatment plant rehabilitation. Select elements of the alternatives are planned as part of Phase 1, as a means of improving the operation of the wastewater plant while the SASS is replaced. The capacity of the existing 0.995 MGD plant will not be increased and will remain a 0.995 MDG plant.

5.1.3.1 Sequencing Batch Reactor (SBR) Alternative

The SBR Alternative involves modifications on all of the existing wastewater plant structures. The existing fine screen is improperly installed and allows solids to bypass the screen. The existing screen will be corrected. The high amount of grit from sand, silt, and corrosion by product will be removed by the addition of a grit removal system. The existing flocculation basin will be converted into a wet well and become a submersible pump station to increase the hydraulic head to flow into the proposed structures. The existing sediment basin will be demolished and replaced with two reactors. A post equalization basin will be constructed over the previous sludge drying beds. A new equipment building will be constructed to contain the pumps and supporting equipment. The existing 95,000 gallon digester will be replaced with two 95,000 gallon digesters. The SBR approach will require the use of a temporary treatment system during the demolition of the existing sediment basin and construction of the reactors. Table 5.1.7 summarizes the Sequencing Batch Reactor Alternative and Figure 5.5 illustrates proposed SRB Layout for this Alternative.

**Table 5.1.7. Alternatives Description: Alternative VI
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Sequencing Batch Reactor (SBR) Alternative Description

The SBR Alternative involves modifications on all of the existing wastewater plant structures. The existing fine screen is improperly installed and allows solids to bypass the screen. The existing screen will be corrected. The high amount of grit from sand, silt, and corrosion by product will be removed by the addition of a grit removal system. The existing flocculation basin will be converted into a wet well and become a submersible pump station to increase the hydraulic head to flow into the proposed structures. The existing sediment basin will be demolished and replaced with two reactors. A post equalization basin will be constructed over the previous sludge drying beds. A new equipment building will be constructed to contain the pumps, blowers, and supporting equipment. The existing 95,000 gallon digester will be replaced with two 95,000 gallon digesters. The chlorine contact will be rehabilitated and the walls extended for flood protection. The SBR approach will require the use of a temporary treatment system during the demolition of the existing sediment basin and construction of the reactors.

Is Figure Included? Yes No **If yes, Figure #:** Figure 5.5

Alternative Feasibility: Feasible Infeasible

Capital Cost: \$8,713,257 **Present Worth:** \$14,410,071

Water Use, Reuse, Recapture, and Conservation

- The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.
- The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.
- The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.

Energy Conservation (CWSRF funded and co-funded projects only)

- The project type is not applicable to energy conservation. Therefore, no analysis has been completed.
- The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed.
- The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.
- The project type is applicable to energy conservation. The analysis is briefly discussed below.

Environmental Impact Description

The environmental impact of the sequencing batch reactor alternative would be limited to the existing wastewater plant site and the adjacent access road. The impacts would primarily be the risk from runoff during rain events that is typical with structure demolition and construction. This alternative would have a slightly greater impact than the preferred alternative due to the inclusion of a temporary treatment plant during the course of the project.

Table 5.1.7. Alternatives Description: Alternative VI Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure	
Environmental Impact Analysis	
<input checked="" type="checkbox"/> Greater than Preferred Alternative <input type="checkbox"/> Less than Preferred Alternative <input type="checkbox"/> Same as Preferred Alternative <input type="checkbox"/> Preferred Alternative	
Alternative: <input type="checkbox"/> Accepted <input checked="" type="checkbox"/> Rejected	
Rationale for Acceptance/Rejection	
<p>The SBR alternative has a higher capital cost and total present worth than the selected alternative. In addition, the O&M cost are higher than the selected alternative. The SBR alternative requires a temporary plant to be utilized during the construction period, and does not provide for future capacity.</p>	



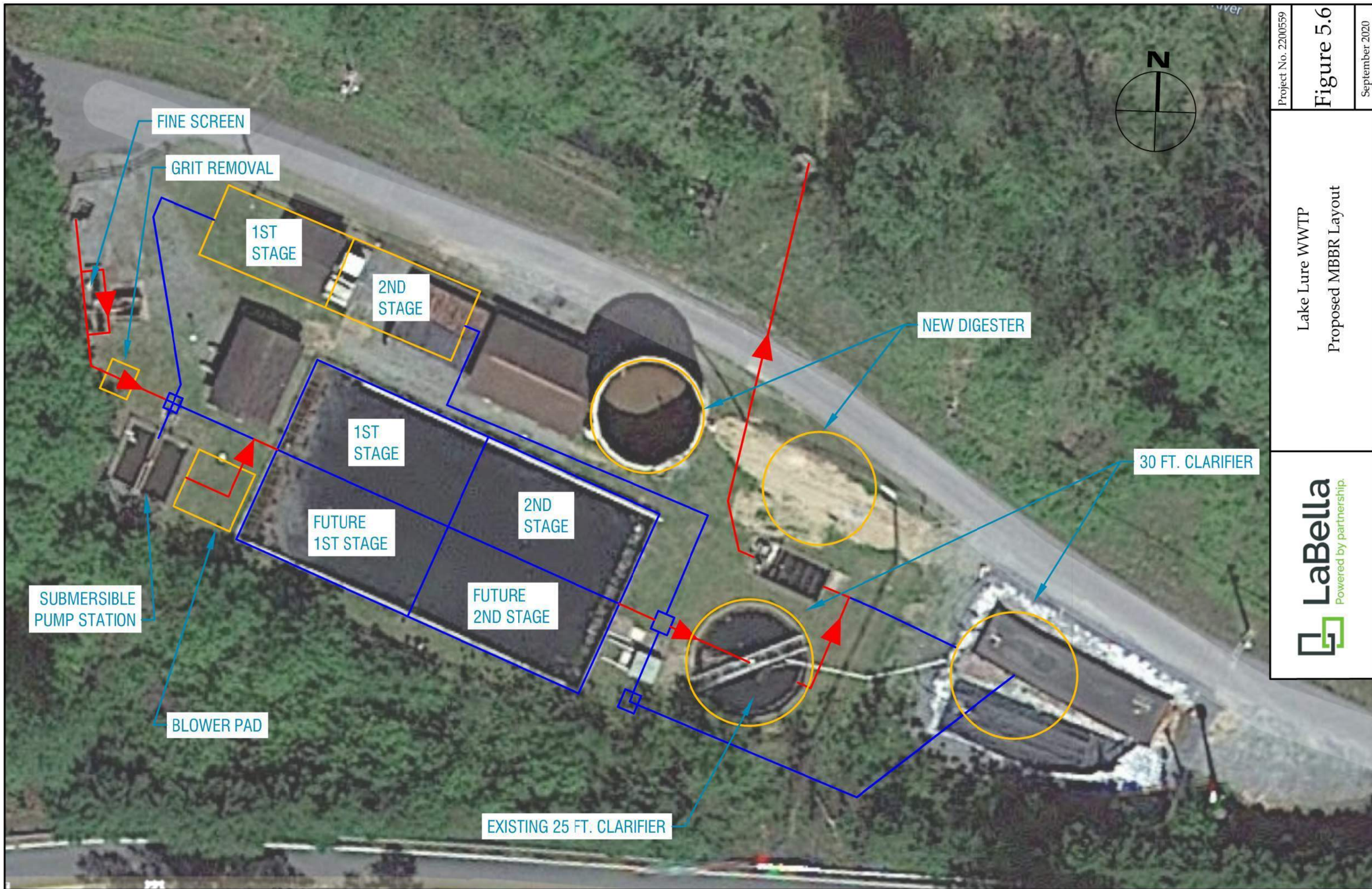
Lake Lure WWTP
Proposed SBR Layout

5.1.3.2 Moving Bed Biological Reactor (MBBR) Alternative

The MBBR Alternative involves modifications on all of the existing wastewater plant structures. The existing fine screen is improperly installed and allows solids to bypass the screen. The existing screen will be corrected. The high amount of grit from sand, silt, and corrosion by product will be removed by the addition of a grit removal system. The existing flocculation basin will be converted into a wet well and become a submersible pump station to increase the hydraulic head to flow into the proposed structures. The plant will consist of three trains, each with two stages. The first stage is for BOD₅ removal and the second for nitrification. The first train will be constructed in the current location of a storage shed and storage boxes. This train will be utilized during the demolition and conversion of the existing sediment basin into the remaining two trains. A new clarifier will be constructed over the previous sludge drying beds, and the existing clarifier demolished and a new clarifier constructed in its place. The existing 95,000 gallon digester will be replaced with two 95,000 gallon digesters. The chlorine contact will be rehabilitated and the walls extended for flood protection. Table 5.1.8 summarizes the Moving Bed Biological Reactor Alternative and Figure 5.6 illustrates proposed MBBR Layout for this Alternative.

Table 5.1.8. Alternatives Description: Alternative VII			
Lake Lure Subaqueous Sanitary Sewer Replacement			
Town of Lake Lure			
Moving Bed Biological Reactor (MBBR) Alternative Description			
<p>The MBBR alternative involves modifications on all of the existing wastewater plant structures. The existing fine screen is improperly installed and allows solids to bypass the screen. The existing screen will be corrected. The high amount of grit from sand, silt, and corrosion by product will be removed by the addition of a grit removal system. The existing flocculation basin will be converted into a wet well and become a submersible pump station to increase the hydraulic head to flow into the proposed structures. The plant will consist of three trains, each with two stages. The first stage is for BOD₅ removal and the second for nitrification. The first train will be constructed in the current location of a storage shed and storage boxes. This train will be utilized during the demolition and conversion of the existing sediment basin into the remaining two trains. A new clarifier will be constructed over the previous sludge drying beds, and the existing clarifier demolished and a new clarifier constructed in its place. The existing 95,000 gallon digester will be replaced with two 95,000 gallon digesters. The chlorine contact will be rehabilitated and the walls extended for flood protection.</p>			
Is Figure Included?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, Figure #: Figure 5.6
Alternative Feasibility:		<input checked="" type="checkbox"/> Feasible <input type="checkbox"/> Infeasible	
Capital Cost:	\$5,914,697	Present Worth:	\$11,276,802

Table 5.1.8. Alternatives Description: Alternative VII Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure	
Water Use, Reuse, Recapture, and Conservation	
<input checked="" type="checkbox"/> The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.	
Energy Conservation (CWSRF funded and co-funded projects only)	
<input checked="" type="checkbox"/> The project type is not applicable to energy conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed. <input type="checkbox"/> The scope of the project is applicable to energy conservation. The analysis is briefly discussed below. <input type="checkbox"/> The project type is applicable to energy conservation. The analysis is briefly discussed below.	
Environmental Impact Description	
<p>The environmental impact of the MBBR alternative would be limited to the existing wastewater plant site and the adjacent access road. The impacts would primarily be the risk from runoff during rain events that is typical with structure demolition and construction. This alternative would have the same environmental impact as the preferred alternative.</p>	
Environmental Impact Analysis	
<input type="checkbox"/> Greater than Preferred Alternative <input type="checkbox"/> Less than Preferred Alternative <input checked="" type="checkbox"/> Same as Preferred Alternative <input type="checkbox"/> Preferred Alternative	
Alternative: <input type="checkbox"/> Accepted <input checked="" type="checkbox"/> Rejected	
Rationale for Acceptance/Rejection	
<p>The MBBR alternative has a slightly higher capital cost and total present worth than the selected alternative. The MBBR alternative requires additional structures to deal with capturing the free floating media and requires a more extensive maintenance of the process trains than the recommended alternative.</p>	



Project No. 2200559

Figure 5.6

September 2020

Lake Lure WWTP
Proposed MBBR Layout

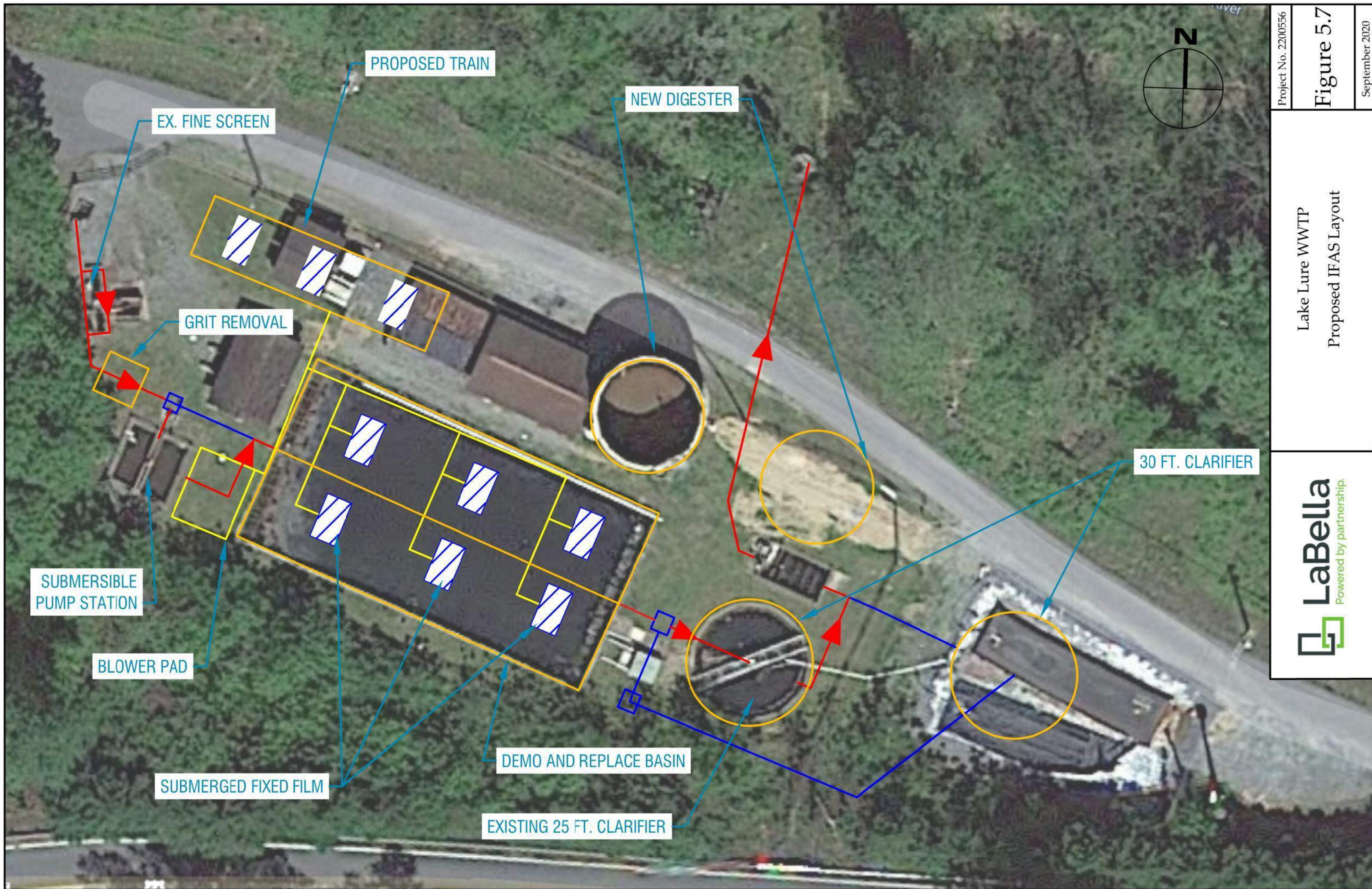


5.1.3.3 Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred)

The IFAS alternative involves modifications on all of the existing wastewater plant structures. The existing fine screen is improperly installed and allows solids to bypass the screen. The existing screen will be corrected. The high amount of grit from sand, silt, and corrosion by product will be removed by the addition of a grit removal system. The existing flocculation basin will be converted into a wet well and become a submersible pump station to increase the hydraulic head to flow into the proposed structures. The plant will consist of three trains, each with a submerged fixed film module that is ballasted and sits on the bottom of the structure. Each module is self-contained and includes fixed media and diffusers for aeration. One of the modules may be removed from the train, without taking the train offline. The first train will be constructed in the current location of a storage shed and storage boxes. This train will be utilized during the demolition and conversion of the existing sediment basin into the remaining two trains. A new clarifier will be constructed over the previous sludge drying beds, and the existing clarifier demolished and a new clarifier constructed in its place. The existing 95,000 gallon digester will be replaced with two 95,000 gallon digesters. The chlorine contact will be rehabilitated and the walls extended for flood protection. Table 5.1.9 summarizes the Integrated Fixed-Film Activated Sludge Alternative and Figure 5.7 illustrates proposed IFAS Layout for this Alternative.

Table 5.1.9. Alternatives Description: Alternative VIII Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure
Integrated Fixed-Film Activated Sludge (IFAS) Alternative Description
<p>The IFAS alternative involves modifications on all of the existing wastewater plant structures. The existing fine screen is improperly installed and allows solids to bypass the screen. The existing screen will be corrected. The high amount of grit from sand, silt, and corrosion by product will be removed by the addition of a grit removal system. The existing flocculation basin will be converted into a wet well and become a submersible pump station to increase the hydraulic head to flow into the proposed structures. The plant will consist of three trains, each with a submerged fixed film module that is ballasted and sits on the bottom of the structure. Each module is self-contained and includes fixed media and diffusers for aeration. One of the modules may be removed from the train, without taking the train offline. The first train will be constructed in the current location of a storage shed and storage boxes. This train will be utilized during the demolition and conversion of the existing sediment basin into the remaining two trains. A new clarifier will be constructed over the previous sludge drying beds, and the existing clarifier demolished and a new clarifier constructed in its place. The existing 95,000 gallon digester will be replaced with two 95,000 gallon digesters. The chlorine contact will be rehabilitated and the walls extended for flood protection.</p>

Table 5.1.9. Alternatives Description: Alternative VIII			
Lake Lure Subaqueous Sanitary Sewer Replacement			
Town of Lake Lure			
Phase 1 of the project would include the correction of the fine screen, the installation of a grit removal system, and the replacement of the existing digester with a new one of the same size. The Phase 1 project specifically deals with improving solids handling of the existing physical/chemical process that would be maintained during the SASS replacement.			
Is Figure Included?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes, Figure #: Figure 5.7
Alternative Feasibility:		<input checked="" type="checkbox"/> Feasible <input type="checkbox"/> Infeasible	
Capital Cost:		\$5,620,585	Present Worth: \$10,983,454
Water Use, Reuse, Recapture, and Conservation			
<input checked="" type="checkbox"/>	The project type is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The scope of the project is not applicable to water use, reuse, recapture, and conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The project type or project scope requires an analysis of water use, reuse, recapture, and conservation. The analysis is briefly discussed below.		
Energy Conservation (CWSRF funded and co-funded projects only)			
<input checked="" type="checkbox"/>	The project type is not applicable to energy conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The scope of the project is not applicable to energy conservation. Therefore, no analysis has been completed.		
<input type="checkbox"/>	The scope of the project is applicable to energy conservation. The analysis is briefly discussed below.		
<input type="checkbox"/>	The project type is applicable to energy conservation. The analysis is briefly discussed below.		
Environmental Impact Description			
The environmental impact of the IFAS alternative would be limited to the existing wastewater plant site and the adjacent access road. The impacts would primarily be the risk from runoff during rain events that is typical with structure demolition and construction. This alternative is the preferred alternative.			
Environmental Impact Analysis			
<input type="checkbox"/>	Greater than Preferred Alternative		
<input type="checkbox"/>	Less than Preferred Alternative		
<input type="checkbox"/>	Same as Preferred Alternative		
<input checked="" type="checkbox"/>	Preferred Alternative		
Alternative:		<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Rejected	
Rationale for Acceptance/Rejection			
The IFAS alternative has the lowest capital cost and total present worth. This alternative has the ability to expand the capacity of the plant and provides for redundancy. The IFAS modules can be removed from the basin and serviced without having to take the basin offline and drain it. In addition, the media is fixed and not subject to loss. This process requires a small footprint and allows for the maximization utilization of the existing site.			



Project No. 2200556

Figure 5.7

September 2020

Lake Lure WWTP
Proposed IFAS Layout

LaBella
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Project No. 2200559

Figure 5.7A

September 2020

Lake Lure WWTP
Phase 1 Layout



5.2 Future Project Phases

As mentioned in Section 3.4, due to the magnitude of the issues with the existing wastewater collection system, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. It is proposed the overall project be completed in six (6) phases. Phase 1 involves construction of some of the gravity lift sewer system, manhole rehabilitation, and work to rehabilitated portions of the Plant and is anticipated to be completed by April 2024. Phases 2 through 5 involve the construction of the rest of the gravity lift sewer system. Each phase is anticipated to take 2 years to complete with Phase 5 ending by April 2032. With the completion of Phase 5 in 2032, all of the existing SASS will have been replaced. Phase 6 involves the complete IFAS conversion of the Plant and is anticipated to be completed in April 2034.

5.3 Alternatives Analysis Summary

Five (5) alternatives for the Subaqueous Sewer System (SASS) replacement were considered and four (4) alternatives for the wastewater treatment plant alternative were considered. Following the selection of the recommended alternative from each category were combined into one project, and then the first phase of the project was pulled out based on the immediate needs and available funding. The installation of a sewer access valve is proposed for and included with all alternatives except the No-Action Alternative.

The Subaqueous Sewer System (SASS) Replacement Alternatives looked at and evaluated were:

- No-Action
- Backshore Gravity/Lift Station (Preferred)
- Backshore Pump Stations
- Backshore Low Pressure Sewer System
- Land-based Low Pressure Sewer System

The No-Action Alternative is in infeasible due to the risk associated with the continued reliance on the SASS and the continued increase in sanitary sewer overflows (SSOs) that will result from the deterioration of the SASS and continued NOV as a result of the lake infiltration. Ultimately, the SASS will fail with catastrophic environmental, social, and economic impacts. All of the backshore approaches utilize a sewer access valve that would be installed in the dam to increase the available construction area, dewater the construction area, and provide for a dam penetration of the proposed systems.

The Backshore Gravity/Lift Station Alternative is the preferred alternative due to the lowest economic and environmental impact. This alternative replaces the SASS and has the least reliance on pump stations. It has the lowest capital and O&M cost and as a result the lowest total present worth. The operation of the alternative also has inherent SSO protection through the utilization of a gravity backup in the pump station, which not only protects the environment from SSOs, but also improves the O&M of the system.

The Backshore Pump Station Alternative is rejected because it has a slightly higher cost and environmental impact due to an increase in the number of pump stations and a greater O&M effort over the preferred alternative.

The Backshore Low Pressure Sewer System is rejected despite having a similar capital cost because of the significantly higher O&M cost due to the enormous increase in pump stations. This reliance on pump stations adds significantly to its social and environmental impact.

The Land-based Low Pressure Sewer Alternative is rejected due the highest capital cost, O&M cost, and total present worth cost. This alternative has the highest social and economic cost.

The Wastewater Treatment Plant (Plant) Alternatives looked at and evaluated were:

- No-Action
- Sequencing Batch Reactor (SBR)
- Moving Bed Biological Reactor (MBBR)
- Integrated Fixed-film Activated Sludge (IFAS) (Preferred)

The No-Action Alternative is infeasible due to the current treatment processes inability to meet the NPDES limits. The Plant will not be able to meet its NPDES limits until it is converted back to a biological process, and this will not be possible until the lake infiltration is removed through the replacement of the SASS. All of the Plant rehabilitation alternatives have similar results in terms of removal efficiencies, however there are differences in cost and O&M that are used to differentiate the alternatives and make a recommendation.

The SBR Alternative is rejected due to the highest total present worth cost, the need to utilize a temporary treatment plant, and lower redundancy offered by the other alternatives.

The MBBR Alternative is rejected despite having only a slightly higher total present worth. The MBBR offers the same redundancy and footprint as the selected alternatives, but the MBBR requires more difficult O&M related to the capture of the free floating media and maintenance of fixed diffusers.

The IFAS Alternative (Preferred) is the selected recommendation due to the lowest total present worth, small foot print, redundancy, and modular submerged fixed film that ease the O&M of the media and diffusers.

5.3.1 Results of the Alternatives Analysis for Phase 1

The results of the alternatives analysis determined the best course of action for Phase 1 of the overall project is to combine the Gravity/Lift Station Alternative (Preferred) with the IFAS Alternative (Preferred) as a solution for the SASS Replacement and Plant Rehabilitation. Due to size, scope, and cost the combined alternatives, this project will be phased based on the immediate needs and \$12.5M in available funding. The Phase 1 project would include the sewer access valve, manhole rehabilitation, partial replacement of the SASS, correcting the fine screen, a grit removal system, and digester.

5.4 Present Worth Analysis

In order to thoroughly evaluate each of the feasible alternatives, the total cost to construct, maintain and operate the system must be estimated. Initial capital costs along with the present worth of operation and maintenance and replacement costs must be estimated in order to thoroughly evaluate each alternative.

5.4.1 No-Action Alternative

Despite the No Action Alternative's seeming zero cost, it actually carries a substantial – yet unquantifiable – cost in that the almost certain failure at some point in the future (as the pipe is aging beyond a century of service) will force the Town to spend potentially millions of dollars in emergency repairs, and even perhaps render the existing system completely unusable, eliminating all sewer service for the Town's residents and dependent upstream systems.

5.4.2 Subaqueous Sanitary Sewer (SASS) Alternatives

5.4.2.1 Backshore Gravity/Lift Stations Alternative (Preferred)

The Backshore Gravity/Lift Stations Alternative will ultimately involve the construction of 19+ miles of predominantly gravity sewers and 15 lift stations, as well as the perpetual energy and maintenance costs of the 15 lift stations. Table 5.2.1 lists the expected capital costs associated with this alternative.

Table 5.2.1 Capital Costs Subaqueous Sanitary Sewer Replacement Town of Lake Lure				
	Backshore Gravity / Lift Stations (Preferred)			
Project Administration (\$):	\$7,355,907			
Component	Unit Cost^a	Unit	Quantity	Total Cost
Sewer Access Valve	\$2,173,913	EA	1	\$2,173,913
4' dia. HDPE Manholes	\$30,000	LF	94	\$2,820,000
6' dia. HDPE Pump Station Manholes	\$45,000	LF	15	\$675,000
Permanent Pump Station Equipment	\$20,000	LF	15	\$300,000
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$1,050,000
4" HDPE Service Connections	\$188	LF	7,200	\$1,350,432
6" HDPE Gravity Sewer	\$288	LF	4,500	\$1,294,200
8" HDPE Gravity Sewer	\$271	LF	39,300	\$10,655,409
10" HDPE Gravity Sewer	\$370	LF	19,900	\$7,362,602
12" HDPE Gravity Sewer	\$369	EA	18,200	\$6,712,888
14" HDPE Gravity Sewer	\$394	LF	15,300	\$6,025,752
16" HDPE Gravity Sewer	\$470	LF	2,300	\$1,080,057
10" HDD across Buffalo Creek	\$650	EA	2,700	\$1,755,000
12" HDD across Cane Creek	\$780	LF	1,700	\$1,326,000
Total Construction Cost:				\$44,581,253
Construction Contingency Cost:				\$4,458,125
Project Administration Cost:				\$7,355,907
Total Capital Cost:				\$56,395,285

The vast majority of system components will have a life cycle substantially exceeding 30 years. HDPE pipe, for example, can be shown to have a historical successful service life of 50 years or more, and studies suggest that it is likely to have a 100-year or greater service life (though the material in pipe form has only been in existence since 1955). The primary serviceable components of this alternative are the sewer access valve, electro-mechanical systems including the pumps and generators, and associated controls. Table 5.2.2 lists the cost life cycle assumptions.

Table 5.2.2 Project Cost Life Cycle Assumptions Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity / Lift Stations (Preferred)			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Sewer Access Valve	75	N	Typical Life Expectancy
4' dia. HDPE Manholes	100	N	Long-term endurance with no corrosion
6' dia. HDPE Pump Station Manholes	100	N	
Permanent Pump Station Equipment	40	N	HDPE / SS / Buried Components
Pump Station Pumps, Electrical, Generator	15	Y	Mechanical / Electrical Equipment
4" HDPE Service Connections	100	N	Long-term endurance with no corrosion
6" HDPE Gravity Sewer	100	N	
8" HDPE Gravity Sewer	100	N	
10" HDPE Gravity Sewer	100	N	
12" HDPE Gravity Sewer	100	N	
14" HDPE Gravity Sewer	100	N	
16" HDPE Gravity Sewer	100	N	
10" HDD across Buffalo Creek	100	N	
12" HDD across Cane Creek	100	N	

†Period for replacement would be Years 1 through 20 only.

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$0.90 per pump station per day, there are substantial future costs that should be accounted for. Equipment replacement costs are as identified in Tables 5.2.3 through 5.2.6, and anticipated O&M costs are as identified in Tables 5.2.7 and 5.2.8. Table 5.2.9 and 5.2.10 identify intermittent costs, namely mechanical equipment services.

**Table 5.2.3 Replacement Costs (Years 1 to 5)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Gravity / Lift Stations (Preferred)**

Current Inflation Rate based on Construction Cost Index:				2.97%			EPA Discount Rate:	4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	LF	94	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	LF	15	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	LF	15	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$369	EA	18,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0
10" HDD across Buffalo Creek	\$650	EA	2,700	\$0	\$0	\$0	\$0	\$0
12" HDD across Cane Creek	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$0

**Table 5.2.4 Replacement Costs (Years 6 to 10)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Gravity / Lift Stations (Preferred)**

Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	LF	94	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	LF	15	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	LF	15	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$369	EA	18,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0
10" HDD across Buffalo Creek	\$650	EA	2,700	\$0	\$0	\$0	\$0	\$0
12" HDD across Cane Creek	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$0	\$0	\$0	\$0

**Table 5.2.5 Replacement Costs (Years 11 to 15)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Gravity / Lift Stations (Preferred)**

Current Inflation Rate based on Construction Cost Index:		2.97%					EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:					
				11	12	13	14	15	
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0	
4' dia. HDPE Manholes	\$30,000	LF	94	\$0	\$0	\$0	\$0	\$0	
6' dia. HDPE Pump Station Manholes	\$45,000	LF	15	\$0	\$0	\$0	\$0	\$0	
Permanent Pump Station Equipment	\$20,000	LF	15	\$0	\$0	\$0	\$0	\$0	
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$797,931	
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0	
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0	
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0	
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0	
12" HDPE Gravity Sewer	\$369	EA	18,200	\$0	\$0	\$0	\$0	\$0	
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0	
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0	
10" HDD across Buffalo Creek	\$650	EA	2,700	\$0	\$0	\$0	\$0	\$0	
12" HDD across Cane Creek	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$0	\$797,931	

Table 5.2.6 Replacement Costs (Years 16 to 20)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Gravity / Lift Stations (Preferred)

Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:					
				16	17	18	19	20	
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0	
4' dia. HDPE Manholes	\$30,000	LF	94	\$0	\$0	\$0	\$0	\$0	
6' dia. HDPE Pump Station Manholes	\$45,000	LF	15	\$0	\$0	\$0	\$0	\$0	
Permanent Pump Station Equipment	\$20,000	LF	15	\$0	\$0	\$0	\$0	\$0	
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$0	
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0	
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0	
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0	
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0	
12" HDPE Gravity Sewer	\$369	EA	18,200	\$0	\$0	\$0	\$0	\$0	
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0	
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0	
10" HDD across Buffalo Creek	\$650	EA	2,700	\$0	\$0	\$0	\$0	\$0	
12" HDD across Cane Creek	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Replacement Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$0	
				Total Present Value of Replacement Costs (Life of Project):					\$797,931

Table 5.2.7 Present Value of Operations and Maintenance Costs (Years 1-10)													
Subaqueous Sanitary Sewer Replacement													
Town of Lake Lure													
Backshore Gravity / Lift Stations (Preferred)													
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Sewer Access Valve	\$100	EA	1	\$95	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66	\$63
Inspection/Cleaning of manholes and pipe	\$1,000	LS	1	\$954	\$911	\$869	\$829	\$792	\$755	\$721	\$688	\$657	\$627
Pumps - Electricity (avg \$0.90/day per LS)	\$329	EA	15	\$4,703	\$4,488	\$4,283	\$4,087	\$3,901	\$3,723	\$3,553	\$3,390	\$3,236	\$3,088
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$5,752	\$5,490	\$5,239	\$5,000	\$4,772	\$4,554	\$4,346	\$4,147	\$3,958	\$3,777

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Table 5.2.8 Present Value of Operations and Maintenance Costs (Years 11-20)														
Subaqueous Sanitary Sewer Replacement														
Town of Lake Lure														
Backshore Gravity / Lift Stations (Preferred)														
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Sewer Access Valve	\$100	EA	1	\$60	\$57	\$54	\$52	\$50	\$47	\$45	\$43	\$41	\$39	
Inspection/Cleaning of manholes and pipe	\$1,000	LS	15	\$8,971	\$8,561	\$8,170	\$7,797	\$7,441	\$7,101	\$6,777	\$6,468	\$6,172	\$5,891	
Pumps - Electricity (avg \$0.90/day per LS)	\$329	EA	15	\$2,947	\$2,812	\$2,684	\$2,561	\$2,444	\$2,333	\$2,226	\$2,125	\$2,028	\$1,935	
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$11,977	\$11,431	\$10,909	\$10,411	\$9,935	\$9,482	\$9,049	\$8,636	\$8,241	\$7,865	
				Total Present Value of Annual O&M Costs (Life of Project):										\$144,969

Table 5.2.9 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)															
Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Backshore Gravity / Lift Stations (Preferred)															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Pumps and Gensets - Service/Rebuild	\$1,500	EA	15	\$0	\$0	\$0	\$0	\$17,811	\$0	\$0	\$0	\$0	\$14,100		
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$17,811	\$0	\$0	\$0	\$0	\$14,100		

Table 5.2.10 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)															
Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Backshore Gravity / Lift Stations (Preferred)															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Pumps and Gensets - Service/Rebuild	\$1,500	EA	15	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,836		
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,836		
												Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):		\$40,747	

5.4.2.2 Backshore Pump Stations Alternative

The Backshore Pump Stations Alternative will ultimately involve the construction of 19+ miles of gravity sewers, 13 miles of force mains and 22 lift stations, as well as the perpetual energy and maintenance costs of the 22 lift stations. Table 5.2.11 lists the expected capital costs associated with this alternative.

Table 5.2.11 Capital Costs Subaqueous Sanitary Sewer Replacement Town of Lake Lure				
Alternative:	Backshore Pump Stations			
Project Administration (\$):	\$8,047,105			
Component	Unit Cost^a	Unit	Quantity	Total Cost
Sewer Access Valve	\$2,173,913	EA	1	\$2,173,913
4' dia. HDPE Manholes	\$30,000	LF	87	\$2,610,000
6' dia. HDPE Pump Station Manholes	\$45,000	LF	22	\$990,000
Permanent Pump Station Equipment	\$20,000	LF	22	\$440,000
Pump Station Pumps, Electrical, Generator	\$70,000	EA	22	\$1,540,000
4" HDPE Service Connections	\$188	LF	7,200	\$1,350,432
8" HDPE Gravity Sewer	\$300	LF	85,800	\$25,761,450
10" HDPE Gravity Sewer	\$374	LF	9,200	\$3,442,640
12" HDPE Gravity Sewer	\$356	EA	7,200	\$2,564,568
4" HDPE Forcemain	\$62	LF	28,300	\$1,743,280
5" HDPE Forcemain	\$92	LF	7,800	\$714,480
6" HDPE Forcemain	\$93	LF	7,700	\$719,488
7" HDPE Forcemain	\$102	LF	10,600	\$1,076,006
8" HDPE Forcemain	\$103	LF	7,300	\$754,674
10" HDPE Forcemain	\$114	LF	6,800	\$776,900
7" HDD across Buffalo Creek	\$455	EA	2,700	\$1,228,500
8" HDD across Cane Creek	\$520	LF	1,700	\$884,000
Total Construction Cost:				\$48,770,331
Construction Contingency Cost:				\$4,877,033
Project Administration Cost:				\$8,047,105
Total Capital Cost:				\$61,694,469

^aUnit costs are in today's dollars, not future dollars.

The vast majority of system components will have a life cycle substantially exceeding 30 years. HDPE pipe, for example, can be shown to have a historical successful service life of 50 years or more, and studies suggest that it is likely to have a 100-year or greater service life (though the material in pipe form has only been in existence since 1955). The primary serviceable components of this alternative are the sewer access valve, electro-

mechanical systems including the pumps and generators, and associated controls. Table 5.2.12 lists the cost life cycle assumptions.

Table 5.2.12 Project Cost Life Cycle Assumptions			
Subaqueous Sanitary Sewer Replacement			
Town of Lake Lure			
Backshore Pump Stations			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Sewer Access Valve	75	N	Typical Life Expectancy
4' dia. HDPE Manholes	100	N	Long-term endurance with no corrosion
6' dia. HDPE Pump Station Manholes	100	N	
Permanent Pump Station Equipment	40	N	HDPE/SS/Buried Components
Pump Station Pumps, Electrical, Generator	15	Y	Mechanical/Electrical Equipment
4" HDPE Service Connections	100	N	Long-term endurance with no corrosion
8" HDPE Gravity Sewer	100	N	
10" HDPE Gravity Sewer	100	N	
12" HDPE Gravity Sewer	100	N	
4" HDPE Forcemain	100	N	
5" HDPE Forcemain	100	N	
6" HDPE Forcemain	100	N	
7" HDPE Forcemain	100	N	
8" HDPE Forcemain	100	N	
10" HDPE Forcemain	100	N	
7" HDD across Buffalo Creek	100	N	
8" HDD across Cane Creek	100	N	

†Period for replacement would be Years 1 through 20 only.

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$1.00 per pump station per day, there are substantial future costs that should be accounted for. Equipment replacement costs are as identified in Tables 5.2.13 through 5.2.16 and anticipated O&M costs are as identified in Tables 5.2.17 and 5.2.18. Table 5.2.19 and 5.2.20 identify intermittent costs, namely mechanical equipment services.

**Table 5.2.13 Replacement Costs (Years 1 to 5)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Backshore Pump Stations

Current Inflation Rate based on Construction Cost Index: 2.97%

EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	LF	87	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	LF	22	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	LF	22	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	22	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$300	LF	85,800	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$374	LF	9,200	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$356	EA	7,200	\$0	\$0	\$0	\$0	\$0
4" HDPE Forcemain	\$62	LF	28,300	\$0	\$0	\$0	\$0	\$0
5" HDPE Forcemain	\$92	LF	7,800	\$0	\$0	\$0	\$0	\$0
6" HDPE Forcemain	\$93	LF	7,700	\$0	\$0	\$0	\$0	\$0
7" HDPE Forcemain	\$102	LF	10,600	\$0	\$0	\$0	\$0	\$0
8" HDPE Forcemain	\$103	LF	7,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Forcemain	\$114	LF	6,800	\$0	\$0	\$0	\$0	\$0
7" HDD across Buffalo Creek	\$455	EA	2,700	\$0	\$0	\$0	\$0	\$0
8" HDD across Cane Creek	\$520	LF	1,700	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$0

**Table 5.2.14 Replacement Costs (Years 6 to 10)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Backshore Pump Stations

Current Inflation Rate based on Construction Cost Index: 2.97%

EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	LF	87	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	LF	22	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	LF	22	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	22	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$300	LF	85,800	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$374	LF	9,200	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$356	EA	7,200	\$0	\$0	\$0	\$0	\$0
4" HDPE Forcemain	\$62	LF	28,300	\$0	\$0	\$0	\$0	\$0
5" HDPE Forcemain	\$92	LF	7,800	\$0	\$0	\$0	\$0	\$0
6" HDPE Forcemain	\$93	LF	7,700	\$0	\$0	\$0	\$0	\$0
7" HDPE Forcemain	\$102	LF	10,600	\$0	\$0	\$0	\$0	\$0
8" HDPE Forcemain	\$103	LF	7,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Forcemain	\$114	LF	6,800	\$0	\$0	\$0	\$0	\$0
7" HDD across Buffalo Creek	\$455	EA	2,700	\$0	\$0	\$0	\$0	\$0
8" HDD across Cane Creek	\$520	LF	1,700	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$0	\$0	\$0	\$0

**Table 5.2.15 Replacement Costs (Years 11 to 15)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Pump Stations**

Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	LF	87	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	LF	22	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	LF	22	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	22	\$0	\$0	\$0	\$0	\$1,170,299
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$300	LF	85,800	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$374	LF	9,200	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$356	EA	7,200	\$0	\$0	\$0	\$0	\$0
4" HDPE Forcemain	\$62	LF	28,300	\$0	\$0	\$0	\$0	\$0
5" HDPE Forcemain	\$92	LF	7,800	\$0	\$0	\$0	\$0	\$0
6" HDPE Forcemain	\$93	LF	7,700	\$0	\$0	\$0	\$0	\$0
7" HDPE Forcemain	\$102	LF	10,600	\$0	\$0	\$0	\$0	\$0
8" HDPE Forcemain	\$103	LF	7,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Forcemain	\$114	LF	6,800	\$0	\$0	\$0	\$0	\$0
7" HDD across Buffalo Creek	\$455	EA	2,700	\$0	\$0	\$0	\$0	\$0
8" HDD across Cane Creek	\$520	LF	1,700	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$0	\$1,170,299

Table 5.2.16 Replacement Costs (Years 16 to 20)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Pump Stations

Current Inflation Rate based on Construction Cost Index:				2.97%			EPA Discount Rate:	4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:					
				16	17	18	19	20	
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0	
4' dia. HDPE Manholes	\$30,000	LF	87	\$0	\$0	\$0	\$0	\$0	
6' dia. HDPE Pump Station Manholes	\$45,000	LF	22	\$0	\$0	\$0	\$0	\$0	
Permanent Pump Station Equipment	\$20,000	LF	22	\$0	\$0	\$0	\$0	\$0	
Pump Station Pumps, Electrical, Generator	\$70,000	EA	22	\$0	\$0	\$0	\$0	\$0	
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0	
8" HDPE Gravity Sewer	\$300	LF	85,800	\$0	\$0	\$0	\$0	\$0	
10" HDPE Gravity Sewer	\$374	LF	9,200	\$0	\$0	\$0	\$0	\$0	
12" HDPE Gravity Sewer	\$356	EA	7,200	\$0	\$0	\$0	\$0	\$0	
4" HDPE Forcemain	\$62	LF	28,300	\$0	\$0	\$0	\$0	\$0	
5" HDPE Forcemain	\$92	LF	7,800	\$0	\$0	\$0	\$0	\$0	
6" HDPE Forcemain	\$93	LF	7,700	\$0	\$0	\$0	\$0	\$0	
7" HDPE Forcemain	\$102	LF	10,600	\$0	\$0	\$0	\$0	\$0	
8" HDPE Forcemain	\$103	LF	7,300	\$0	\$0	\$0	\$0	\$0	
10" HDPE Forcemain	\$114	LF	6,800	\$0	\$0	\$0	\$0	\$0	
7" HDD across Buffalo Creek	\$455	EA	2,700	\$0	\$0	\$0	\$0	\$0	
8" HDD across Cane Creek	\$520	LF	1,700	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Replacment Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$0	
				Total Present Value of Replacement Costs (Life of Project):					\$1,170,299

Table 5.2.17 Present Value of Operations and Maintenance Costs (Years 1-10)													
Subaqueous Sanitary Sewer Replacement													
Town of Lake Lure													
Backshore Pump Stations													
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Sewer Access Valve	\$100	EA	1	\$95	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66	\$63
Inspection/Cleaning of manholes and pipe	\$1,000	LS	1	\$954	\$911	\$869	\$829	\$792	\$755	\$721	\$688	\$657	\$627
Pumps - Electricity (avg \$1.00/day per LS)	\$365	EA	22	\$7,663	\$7,313	\$6,980	\$6,661	\$6,357	\$6,066	\$5,789	\$5,525	\$5,273	\$5,032
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$8,713	\$8,315	\$7,936	\$7,573	\$7,228	\$6,898	\$6,583	\$6,282	\$5,995	\$5,721

Table 5.2.18 Present Value of Operations and Maintenance Costs (Years 11-20)														
Subaqueous Sanitary Sewer Replacement														
Town of Lake Lure														
Backshore Pump Stations														
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Sewer Access Valve	\$100	EA	1	\$60	\$57	\$54	\$52	\$50	\$47	\$45	\$43	\$41	\$39	
Inspection/Cleaning of manholes and pipe	\$1,000	LS	1	\$598	\$571	\$545	\$520	\$496	\$473	\$452	\$431	\$411	\$393	
Pumps - Electricity (avg \$1.00/day per LS)	\$365	EA	22	\$4,802	\$4,583	\$4,374	\$4,174	\$3,984	\$3,802	\$3,628	\$3,462	\$3,304	\$3,153	
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$5,460	\$5,211	\$4,973	\$4,746	\$4,529	\$4,322	\$4,125	\$3,937	\$3,757	\$3,585	
												Total Present Value of Annual O&M Costs (Life of Project):		\$115,889

Table 5.2.19 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)													
Subaqueous Sanitary Sewer Replacement													
Town of Lake Lure													
Backshore Pump Stations													
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Pumps - Service/Rebuild	\$1,500	EA	22	\$0	\$0	\$0	\$0	\$26,124	\$0	\$0	\$0	\$0	\$20,680
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$26,124	\$0	\$0	\$0	\$0	\$20,680

Table 5.2.20 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)													
Subaqueous Sanitary Sewer Replacement													
Town of Lake Lure													
Backshore Pump Stations													
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				11	12	13	14	15	16	17	18	19	20
Pumps - Service/Rebuild	\$1,500	EA	22	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12,959
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$12,959
				Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):									\$59,763

5.4.2.3 Backshore Low Pressure Sewer System Alternative

The Backshore Low Pressure Sewer System Alternative will ultimately involve the construction of 19+ miles of force mains and 1,112 individual grinder pump stations, as well as the perpetual energy and maintenance costs of those individual pump stations. Table 5.2.21 lists the expected capital costs associated with this alternative.

Table 5.2.21 Capital Costs Subaqueous Sanitary Sewer Replacement Town of Lake Lure				
Alternative:		Backshore Low Pressure Sewer System		
Project Administration (\$):		\$7,389,588		
Component	Unit Cost^a	Unit	Quantity	Total Cost
Sewer Access Valve	\$2,173,913	EA	1	\$2,173,913
HDPE 2" Force Main	\$60	LF	24,852	\$1,491,120
HDPE 3" Force Main	\$90	LF	20,491	\$1,844,190
HDPE 4" Force Main	\$120	LF	15,788	\$1,894,560
HDPE 6" Force Main	\$180	LF	30,620	\$5,511,600
HDPE 8" Force Main	\$240	LF	8,850	\$2,124,000
Low Pressure Grinder Pump Station	\$15,000	EA	1,112	\$16,680,000
Intermediate Pump Stations	\$500,000	EA	2	\$1,000,000
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$500,000
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$350,000
Lateral Connections	\$2,000	EA	1,112	\$2,224,000
HDPE Force Main installed by HDD	\$780	LF	4,400	\$3,432,000
Right-of-Way Acquisition	\$5,000	EA	1,112	\$5,560,000
^a Unit costs are in today's dollars, not future dollars.		Total Construction Cost:		\$44,785,383
		Construction Contingency Cost:		\$4,478,538
		Project Administration Cost:		\$7,389,588
		Total Capital Cost:		\$56,653,509

The vast majority of system components will have a life cycle substantially exceeding 30 years. HDPE pipe, for example, can be shown to have a historical successful service life of 50 years or more, and studies suggest that it is likely to have a 100-year or greater service life (though the material in pipe form has only been in existence since 1955). The primary serviceable component of this alternative is the electro-mechanical systems including the pumps and generators, and associated controls. Table 5.2.22 lists the cost life cycle assumptions.

Table 5.2.22 Project Cost Life Cycle Assumptions Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Low Pressure Sewer System			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Sewer Access Valve	75	N	Typical Life Expectancy
HDPE 2" Force Main	100	N	Long-term endurance with no corrosion
HDPE 3" Force Main	100	N	
HDPE 4" Force Main	100	N	
HDPE 6" Force Main	100	N	
HDPE 8" Force Main	100	N	
Low Pressure Grinder Pump Station	7	Y	
Intermediate Pump Stations	15	Y	
Pump Station serving Chimney Rock Village	15	Y	
Pump Station serving Rumbling Bald Resort	15	Y	
Lateral Connections	100	N	Long-term endurance with no corrosion
HDPE Force Main installed by HDD	100	N	

†Period for replacement would be Years 1 through 20 only.

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$1.00 per pump station per day, there are substantial future costs that should be accounted for. Equipment replacement costs are as identified in Tables 5.2.23 through 5.2.26, and anticipated O&M costs (electricity) are as identified in Tables 5.2.27 and 5.2.28. Table 5.2.29 and 5.2.30 identify intermittent costs, namely mechanical equipment services.

**Table 5.2.23 Replacement Costs (Years 1 to 5)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Backshore Low Pressure Sewer System								
Current Inflation Rate based on Construction Cost Index:			2.97%			EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
HDPE 2" Force Main	\$60	LF	24,852	\$0	\$0	\$0	\$0	\$0
HDPE 3" Force Main	\$90	LF	20,491	\$0	\$0	\$0	\$0	\$0
HDPE 4" Force Main	\$120	LF	15,788	\$0	\$0	\$0	\$0	\$0
HDPE 6" Force Main	\$180	LF	30,620	\$0	\$0	\$0	\$0	\$0
HDPE 8" Force Main	\$240	LF	8,850	\$0	\$0	\$0	\$0	\$0
Low Pressure Grinder Pump Station	\$6,127	EA	1,112	\$0	\$0	\$0	\$0	\$0
Intermediate Pump Stations	\$500,000	EA	2	\$0	\$0	\$0	\$0	\$0
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$0
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$0
Lateral Connections	\$2,000	EA	1,112	\$0	\$0	\$0	\$0	\$0
HDPE Force Main installed by HDD	\$780	LF	4,400	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$0

**Table 5.2.24 Replacement Costs (Years 6 to 10)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Backshore Low Pressure Sewer System

Current Inflation Rate based on Construction Cost Index: 2.97% EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
HDPE 2" Force Main	\$60	LF	24,852	\$0	\$0	\$0	\$0	\$0
HDPE 3" Force Main	\$90	LF	20,491	\$0	\$0	\$0	\$0	\$0
HDPE 4" Force Main	\$120	LF	15,788	\$0	\$0	\$0	\$0	\$0
HDPE 6" Force Main	\$180	LF	30,620	\$0	\$0	\$0	\$0	\$0
HDPE 8" Force Main	\$240	LF	8,850	\$0	\$0	\$0	\$0	\$0
Low Pressure Grinder Pump Station	\$6,172	EA	1,112	\$0	\$6,037,996	\$0	\$0	\$0
Intermediate Pump Stations	\$500,000	EA	2	\$0	\$0	\$0	\$0	\$0
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$0
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$0
Lateral Connections	\$2,000	EA	1,112	\$0	\$0	\$0	\$0	\$0
HDPE Force Main installed by HDD	\$780	LF	4,400	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$6,037,996	\$0	\$0	\$0

**Table 5.2.25 Replacement Costs (Years 11 to 15)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Low Pressure Sewer System**

Current Inflation Rate based on Construction Cost Index: 2.97%				EPA Discount Rate: 4.875%				
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
HDPE 2" Force Main	\$60	LF	24,852	\$0	\$0	\$0	\$0	\$0
HDPE 3" Force Main	\$90	LF	20,491	\$0	\$0	\$0	\$0	\$0
HDPE 4" Force Main	\$120	LF	15,788	\$0	\$0	\$0	\$0	\$0
HDPE 6" Force Main	\$180	LF	30,620	\$0	\$0	\$0	\$0	\$0
HDPE 8" Force Main	\$240	LF	8,850	\$0	\$0	\$0	\$0	\$0
Low Pressure Grinder Pump Station	\$6,172	EA	1,112	\$0	\$0	\$0	\$5,311,963	\$0
Intermediate Pump Stations	\$500,000	EA	2	\$0	\$0	\$0	\$0	\$759,934
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$379,967
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$265,977
Lateral Connections	\$2,000	EA	1,112	\$0	\$0	\$0	\$0	\$0
HDPE Force Main installed by HDD	\$780	LF	4,400	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$5,311,963	\$1,405,878

Table 5.2.26 Replacement Costs (Years 16 to 20)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Backshore Low Pressure Sewer System

Current Inflation Rate based on Construction Cost Index:				2.97%			EPA Discount Rate:	4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:					
				16	17	18	19	20	
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0	
HDPE 2" Force Main	\$60	LF	24,852	\$0	\$0	\$0	\$0	\$0	
HDPE 3" Force Main	\$90	LF	20,491	\$0	\$0	\$0	\$0	\$0	
HDPE 4" Force Main	\$120	LF	15,788	\$0	\$0	\$0	\$0	\$0	
HDPE 6" Force Main	\$180	LF	30,620	\$0	\$0	\$0	\$0	\$0	
HDPE 8" Force Main	\$240	LF	8,850	\$0	\$0	\$0	\$0	\$0	
Low Pressure Grinder Pump Station	\$6,172	EA	1,112	\$0	\$0	\$0	\$0	\$0	
Intermediate Pump Stations	\$500,000	EA	2	\$0	\$0	\$0	\$0	\$0	
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$0	
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$0	
Lateral Connections	\$2,000	EA	1,112	\$0	\$0	\$0	\$0	\$0	
HDPE Force Main installed by HDD	\$780	LF	4,400	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Replacment Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$0	
				Total Present Value of Replacement Costs (Life of Project):					\$12,755,837

Table 5.2.27 Present Value of Operations and Maintenance Costs (Years 1-10)													
Subaqueous Sanitary Sewer Replacement													
Town of Lake Lure													
Backshore Low Pressure Sewer System													
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Sewer Access Valve	\$100	EA	1	\$95	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66	\$63
Low Pressure Grinder Pump Station	\$42	EA	1,112	\$44,572	\$42,536	\$40,594	\$38,741	\$36,972	\$35,284	\$33,673	\$32,135	\$30,668	\$29,268
Intermediate Pump Station No. 1	\$13,205	EA	1	\$12,602	\$12,027	\$11,478	\$10,953	\$10,453	\$9,976	\$9,521	\$9,086	\$8,671	\$8,275
Pump Station serving Chimney Rock Village	\$24,375	EA	1	\$23,262	\$22,200	\$21,186	\$20,219	\$19,296	\$18,415	\$17,574	\$16,772	\$16,006	\$15,275
Pump Station serving Rumbling Bald Resort	\$12,286	EA	1	\$11,725	\$11,190	\$10,679	\$10,191	\$9,726	\$9,282	\$8,858	\$8,454	\$8,068	\$7,699
Intermediate Pump Station No. 2	\$36,792	EA	1	\$35,112	\$33,509	\$31,979	\$30,519	\$29,125	\$27,796	\$26,526	\$25,315	\$24,159	\$23,056
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$127,368	\$121,553	\$116,003	\$110,706	\$105,651	\$100,827	\$96,224	\$91,830	\$87,637	\$83,636

Table 5.2.28 Present Value of Operations and Maintenance Costs (Years 11-20)														
Subaqueous Sanitary Sewer Replacement														
Town of Lake Lure														
Backshore Low Pressure Sewer System														
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Sewer Access Valve	\$100	EA	1	\$60	\$57	\$54	\$52	\$50	\$47	\$45	\$43	\$41	\$39	
Low Pressure Grinder Pump Station	\$42	EA	1,112	\$27,931	\$26,656	\$25,439	\$24,277	\$23,169	\$22,111	\$21,102	\$20,138	\$19,219	\$18,341	
Intermediate Pump Station No. 1	\$13,205	EA	1	\$7,897	\$7,537	\$7,193	\$6,864	\$6,551	\$6,252	\$5,966	\$5,694	\$5,434	\$5,186	
Pump Station serving Chimney Rock Village	\$24,375	EA	1	\$14,578	\$13,912	\$13,277	\$12,671	\$12,092	\$11,540	\$11,013	\$10,510	\$10,030	\$9,572	
Pump Station serving Rumbling Bald Resort	\$12,286	EA	1	\$7,348	\$7,012	\$6,692	\$6,386	\$6,095	\$5,817	\$5,551	\$5,298	\$5,056	\$4,825	
Intermediate Pump Station No. 2	\$36,792	EA	1	\$22,004	\$20,999	\$20,040	\$19,125	\$18,252	\$17,418	\$16,623	\$15,864	\$15,140	\$14,449	
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$79,817	\$76,173	\$72,695	\$69,376	\$66,208	\$63,185	\$60,300	\$57,547	\$54,919	\$52,412	
													Total Present Value of Annual O&M Costs (Life of Project):	\$1,694,068

Table 5.2.29 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)														
Subaqueous Sanitary Sewer Replacement														
Town of Lake Lure														
Backshore Low Pressure Sewer System														
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				1	2	3	4	5	6	7	8	9	10	
Pump Rebuilds	\$2,500	EA	8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,420	\$0	\$0	\$0
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,420	\$0	\$0	\$0

Table 5.2.30 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)														
Subaqueous Sanitary Sewer Replacement														
Town of Lake Lure														
Backshore Low Pressure Sewer System														
Current Inflation Rate Based on Municipal Cost Index:				0.09%				EPA Discount Rate:				4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Pump Rebuilds	\$2,500	EA	8	\$0	\$0	\$0	\$10,396	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$10,396	\$0	\$0	\$0	\$0	\$0	\$0	\$0
				Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):										\$24,816

5.4.2.4 Land-Based Low Pressure Sewer System Alternative

The Land-Based Low Pressure Sewer System Alternative will ultimately involve the construction of 28+ miles of force mains and 760 individual grinder pump stations, as well as the perpetual energy and maintenance costs of those individual pump stations. Table 5.2.31 lists the expected capital costs associated with this alternative.

Table 5.2.31 Capital Costs Subaqueous Sanitary Sewer Replacement Town of Lake Lure				
Alternative:	Land-Based Low Pressure Sewer System			
Project Administration (\$):	\$9,133,649			
Component	Unit Cost^a	Unit	Quantity	Total Cost
Sewer Access Valve	\$2,173,913	EA	1	\$2,173,913
HDPE 2" Force Main	\$81	LF	80,500	\$6,520,500
HDPE 3" Force Main	\$121	LF	4,000	\$484,800
HDPE 4" Force Main	\$162	LF	51,000	\$8,241,600
HDPE 6" Force Main	\$243	LF	11,000	\$2,675,530
Low Pressure Grinder Pump Station	\$20,000	EA	760	\$15,200,000
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$500,000
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$350,000
Lateral Connections	\$2,000	EA	760	\$1,520,000
Right-of-Way Acquisition	\$5,000	EA	760	\$3,800,000
Force Main Right-of-Way Acquisition	\$52,289	AC	29	\$1,521,604
Rock Excavation and Removal	\$500	CY	11,100	\$5,550,000
Asphalt Replacement	\$6,500	SF	145	\$942,500
Clearing and Grubbing	\$200,000	LS	1	\$200,000
Stone	\$45	TN	15,000	\$675,000
NC DOT Fill Material	\$200	CY	25,000	\$5,000,000
^a Unit costs are in today's dollars, not future dollars.	Total Construction Cost:			\$55,355,447
	Construction Contingency Cost:			\$5,535,545
	Project Administration Cost:			\$9,133,649
	Total Capital Cost:			\$70,024,641

The vast majority of system components will have a life cycle substantially exceeding 30 years. HDPE pipe, for example, can be shown to have a historical successful service life of 50 years or more, and studies suggest that it is likely to have a 100-year or greater service life (though the material in pipe form has only been in existence since 1955). The primary serviceable component of this alternative is the electro-mechanical systems including the pumps and generators, and associated controls. Table 5.2.32 lists the cost life cycle assumptions.

Table 5.2.32 Project Cost Life Cycle Assumptions Subaqueous Sanitary Sewer Replacement Town of Lake Lure			
Land-Based Low Pressure Sewer System			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Sewer Access Valve	75	N	Typical Life Expectancy
HDPE 2" Force Main	100	N	Long-term Endurance with no Corrosion
HDPE 3" Force Main	100	N	
HDPE 4" Force Main	100	N	
HDPE 6" Force Main	100	N	
Low Pressure Grinder Pump Station	7	Y	
Pump Station serving Chimney Rock Village	15	Y	
Pump Station serving Rumbling Bald Resort	15	Y	
Lateral Connections	100	N	Long-term Endurance with no Corrosion
Asphalt Replacement	20	Y	Typical Paving Schedule

†Period for replacement would be Years 1 through 20 only.

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$1.00 per pump station per day, there are substantial future costs that should be accounted for. Equipment replacement costs are as identified in Tables 5.2.32 through 5.2.36, and anticipated O&M costs (electricity) are as identified in Tables 5.2.37 and 5.2.38. Table 5.2.39 and 5.2.40 identify intermittent costs, namely mechanical equipment services.

**Table 5.2.33 Replacement Costs (Years 1 to 5)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Land-Based Low Pressure Sewer System

Current Inflation Rate based on Construction Cost Index: 2.97% EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
HDPE 2" Force Main	\$81	LF	80,500	\$0	\$0	\$0	\$0	\$0
HDPE 3" Force Main	\$121	LF	4,000	\$0	\$0	\$0	\$0	\$0
HDPE 4" Force Main	\$162	LF	51,000	\$0	\$0	\$0	\$0	\$0
HDPE 6" Force Main	\$243	LF	11,000	\$0	\$0	\$0	\$0	\$0
Low Pressure Grinder Pump Station	\$6,172	EA	760	\$0	\$0	\$0	\$0	\$0
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$0
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$0
Lateral Connections	\$2,000	EA	760	\$0	\$0	\$0	\$0	\$0
Asphalt Replacement	\$6,500	SF	145	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$0

**Table 5.2.34 Replacement Costs (Years 6 to 10)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Land-Based Low Pressure Sewer System

Current Inflation Rate based on Construction Cost Index: 2.97% EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
HDPE 2" Force Main	\$81	LF	80,500	\$0	\$0	\$0	\$0	\$0
HDPE 3" Force Main	\$121	LF	4,000	\$0	\$0	\$0	\$0	\$0
HDPE 4" Force Main	\$162	LF	51,000	\$0	\$0	\$0	\$0	\$0
HDPE 6" Force Main	\$243	LF	11,000	\$0	\$0	\$0	\$0	\$0
Low Pressure Grinder Pump Station	\$6,172	EA	760	\$0	\$4,126,688	\$0	\$0	\$0
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$0
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$0
Lateral Connections	\$2,000	EA	760	\$0	\$0	\$0	\$0	\$0
Asphalt Replacement	\$6,500	SF	145	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$4,126,688	\$0	\$0	\$0

**Table 5.2.35 Replacement Costs (Years 11 to 15)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Land-Based Low Pressure Sewer System**

Current Inflation Rate based on Construction Cost Index: 2.97%				EPA Discount Rate: 4.875%				
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
HDPE 2" Force Main	\$81	LF	80,500	\$0	\$0	\$0	\$0	\$0
HDPE 3" Force Main	\$121	LF	4,000	\$0	\$0	\$0	\$0	\$0
HDPE 4" Force Main	\$162	LF	51,000	\$0	\$0	\$0	\$0	\$0
HDPE 6" Force Main	\$243	LF	11,000	\$0	\$0	\$0	\$0	\$0
Low Pressure Grinder Pump Station	\$6,172	EA	760	\$0	\$0	\$0	\$3,630,478	\$0
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$379,967
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$265,977
Lateral Connections	\$2,000	EA	760	\$0	\$0	\$0	\$0	\$0
Asphalt Replacement	\$6,500	SF	145	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$3,630,478	\$645,944

**Table 5.2.36 Replacement Costs (Years 16 to 20)
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure
Land-Based Low Pressure Sewer System**

Current Inflation Rate based on Construction Cost Index:				2.97%		EPA Discount Rate:			4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:					
				16	17	18	19	20	
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0	
HDPE 2" Force Main	\$81	LF	80,500	\$0	\$0	\$0	\$0	\$0	
HDPE 3" Force Main	\$121	LF	4,000	\$0	\$0	\$0	\$0	\$0	
HDPE 4" Force Main	\$162	LF	51,000	\$0	\$0	\$0	\$0	\$0	
HDPE 6" Force Main	\$243	LF	11,000	\$0	\$0	\$0	\$0	\$0	
Low Pressure Grinder Pump Station	\$6,172	EA	760	\$0	\$0	\$0	\$0	\$0	
Pump Station serving Chimney Rock Village	\$500,000	LS	1	\$0	\$0	\$0	\$0	\$0	
Pump Station serving Rumbling Bald Resort	\$350,000	LS	1	\$0	\$0	\$0	\$0	\$0	
Lateral Connections	\$2,000	EA	760	\$0	\$0	\$0	\$0	\$0	
Asphalt Replacement	\$6,500	SF	145	\$0	\$0	\$0	\$0	\$653,606	
Total Present Value of Replacment Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$653,606	
				Total Present Value of Replacement Costs (Life of Project):				\$9,056,716	

Table 5.2.37 Present Value of Operations and Maintenance Costs (Years 1-10)															
Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Land-Based Low Pressure Sewer System															
Current Inflation Rate Based on Municipal Cost Index:				0.09%						EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Sewer Access Valve	\$100	EA	1	\$95	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66	\$63		
Low Pressure Grinder Pump Station	\$42	EA	760	\$30,463	\$29,072	\$27,744	\$26,478	\$25,269	\$24,115	\$23,014	\$21,963	\$20,960	\$20,003		
Pump Station serving Chimney Rock Village	\$24,375	EA	1	\$23,262	\$22,200	\$21,186	\$20,219	\$19,296	\$18,415	\$17,574	\$16,772	\$16,006	\$15,275		
Pump Station serving Rumbling Bald Resort	\$12,286	EA	1	\$11,725	\$11,190	\$10,679	\$10,191	\$9,726	\$9,282	\$8,858	\$8,454	\$8,068	\$7,699		
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$65,545	\$62,552	\$59,696	\$56,971	\$54,369	\$51,887	\$49,518	\$47,257	\$45,099	\$43,040		

Table 5.2.38 Present Value of Operations and Maintenance Costs (Years 11-20)															
Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Land-Based Low Pressure Sewer System															
Current Inflation Rate Based on Municipal Cost Index:				0.09%						EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Sewer Access Valve	\$100	EA	1	\$60	\$57	\$54	\$52	\$50	\$47	\$45	\$43	\$41	\$39		
Low Pressure Grinder Pump Station	\$42	EA	760	\$19,090	\$18,218	\$17,386	\$16,593	\$15,835	\$15,112	\$14,422	\$13,763	\$13,135	\$12,535		
Pump Station serving Chimney Rock Village	\$24,375	EA	1	\$14,578	\$13,912	\$13,277	\$12,671	\$12,092	\$11,540	\$11,013	\$10,510	\$10,030	\$9,572		
Pump Station serving Rumbling Bald Resort	\$12,286	EA	1	\$7,348	\$7,012	\$6,692	\$6,386	\$6,095	\$5,817	\$5,551	\$5,298	\$5,056	\$4,825		
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$41,075	\$39,199	\$37,410	\$35,701	\$34,071	\$32,516	\$31,031	\$29,614	\$28,262	\$26,972		
													Total Present Value of Annual O&M Costs (Life of Project):	\$871,786	

Table 5.2.39 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)															
Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Land-Based Low Pressure Sewer System															
Current Inflation Rate Based on Municipal Cost Index:				0.09%						EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Pump Rebuilds	\$2,500	EA	4	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,210	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,210	\$0	\$0	\$0	

Table 5.2.40 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)															
Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Land-Based Low Pressure Sewer System															
Current Inflation Rate Based on Municipal Cost Index:				0.09%						EPA Discount Rate:				4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Pump Rebuilds	\$2,500	EA	4	\$0	\$0	\$0	\$5,198	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$5,198	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):													\$12,408		

5.4.3 Wastewater Treatment Plant (Plant) Alternatives

5.4.3.1 Sequencing Batch Reactor (SBR) Alternative

The Sequencing Batch Reactor (SBR) Alternative will ultimately involve modifications to all of the existing wastewater plant structures. Table 5.2.41 lists the expected capital costs associated with this alternative.

Table 5.2.41 Capital Costs Wastewater Treatment Plant Rehabilitation Town of Lake Lure				
Sequencing Batch Reactor				
Project Administration (15% in \$):	\$1,136,512			
Component	Unit Cost^a	Unit	Quantity	Total Cost
SBR Equipment Package	\$700,000	LS	1	\$700,000
Tertiary Filters	\$50,000	LS	1	\$50,000
Equipment Installation	\$1,000,000	LS	1	\$1,000,000
Fine Screen Rehabilitation	\$15,000	LS	1	\$15,000
Grit Removal System	\$196,000	LS	1	\$196,000
Ultraviolet Disinfection	\$174,000	LS	1	\$174,000
Digester, Piping, and Diffusers	\$100,000	LS	2	\$200,000
Excavation	\$100	SY	4,000	\$400,000
Rock Removal	\$250	CY	4,139	\$1,034,750
Stone backfill	\$150	TN	928	\$139,200
SBR Tank	\$275,000	EA	1	\$275,000
Post Equalization Tank	\$114,000	EA	1	\$114,000
Equipment Building	\$800	SF	200	\$160,000
Temporary Plant	\$5	GAL	200,000	\$1,000,000
Yard Piping and Air Piping	\$1,110,000	LS	1	\$1,110,000
Demo Existing Basin	\$500	YD	70	\$35,000
Ex. PS and piping abandonment	\$35,000	EA	1	\$35,000
Submersible Pump Station	\$250,000	EA	1	\$250,000
^a Unit costs are in today's dollars, not future dollars.	Total Construction Cost:			\$6,887,950
	Construction Contingency Cost:			\$688,795
	Project Administration Cost:			\$1,136,512
	Total Capital Cost:			\$8,713,257

The vast majority of system components will have a life cycle of 20 years or less. The primary serviceable components of this alternative are the grit removal system, ultraviolet bulbs, tertiary filters, and diffusers. An additional serviceable component of this alternative

is the electro-mechanical systems including the pumps and generators, and associated controls. Table 5.2.42 lists the cost life cycle assumptions.

Table 5.2.42 Project Cost Life Cycle Assumptions Wastewater Treatment Plant Rehabilitation Town of Lake Lure Sequencing Batch Reactor			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Fine Screen	20	Y	Typical Service Life
Grit Removal System	20	Y	Mechanical/Electrical Equipment
Ultraviolet Disinfection	10	Y	Typical Service Life of Bulbs
Tertiary Filters	10	Y	Typical Service Life
Digester, Piping, and Diffusers	5	Y	Typical Service Life of Diffusers
Yard Piping and Air Piping	50	N	Long-term endurance with no corrosion
Blower Package	20	Y	Typical Service Life
Submersible Pump Station	15	Y	Typical Service Life of Pumps

†Period for replacement would be Years 1 through 20 only.

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$0.90 per pump station per day, there are substantial future costs that should be accounted for. Additional components that will require replacements and maintenance include the fine screen, grit removal system, ultraviolet bulbs, tertiary filters, and diffusers. Equipment replacement costs are as identified in Table 5.2.43 through 5.2.46, and anticipated O&M costs are as identified in Tables 5.2.47 and 5.2.48. Table 5.2.49 and 5.2.50 identify intermittent costs, namely mechanical equipment services.

**Table 5.2.43 Replacement Costs (Years 1 to 5)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Sequencing Batch Reactor								
Current Inflation Rate based on Construction Cost Index:			2.97%			EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Ultraviolet Disinfection Bulbs	\$150	EA	32	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	LS	64	\$0	\$0	\$0	\$0	\$876
Fine Bubble Diffusers	\$10	EA	700	\$0	\$0	\$0	\$0	\$6,388
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	EA	1	\$0	\$0	\$0	\$0	\$0
Tertiary Filter	\$50,000	EA	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$7,264

**Table 5.2.44 Replacement Costs (Years 6 to 10)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Sequencing Batch Reactor								
Current Inflation Rate based on Construction Cost Index:		2.97%			EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Ultraviolet Disinfection Bulbs	\$150	EA	32	\$0	\$0	\$0	\$0	\$3,997
Digester Diffusers	\$15	LS	64	\$0	\$0	\$0	\$0	\$799
Fine Bubble Diffusers	\$10	EA	700	\$0	\$0	\$0	\$0	\$5,829
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$124,913
Blower Package	\$150,000	EA	1	\$0	\$0	\$0	\$0	\$0
Tertiary Filter	\$50,000	EA	1	\$0	\$0	\$0	\$0	\$41,638
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$0	\$0	\$0	\$177,177

**Table 5.2.45 Replacement Costs (Years 11 to 15)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Sequencing Batch Reactor

Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Ultraviolet Disinfection Bulbs	\$150	EA	32	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	LS	64	\$0	\$0	\$0	\$0	\$730
Fine Bubble Diffusers	\$10	EA	700	\$0	\$0	\$0	\$0	\$5,320
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$189,984
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	EA	1	\$0	\$0	\$0	\$0	\$0
Tertiary Filter	\$50,000	EA	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$0	\$196,033

**Table 5.2.46 Replacement Costs (Years 16 to 20)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Sequencing Batch Reactor									
Current Inflation Rate based on Construction Cost Index:			2.97%			EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:					
				16	17	18	19	20	
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$81,484	
Ultraviolet Disinfection Bulbs	\$150	EA	32	\$0	\$0	\$0	\$0	\$3,329	
Digester Diffusers	\$15	LS	64	\$0	\$0	\$0	\$0	\$666	
Fine Bubble Diffusers	\$10	EA	30	\$0	\$0	\$0	\$0	\$208	
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$69,348	
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0	
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$104,022	
Blower Package	\$150,000	EA	1	\$0	\$0	\$0	\$0	\$104,022	
Tertiary Filter	\$50,000	EA	1	\$0	\$0	\$0	\$0	\$34,674	
Total Present Value of Replacement Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$397,753	
				Total Present Value of Replacement Costs (Life of Project):					\$778,227

Table 5.2.47 Present Value of Operations and Maintenance Costs (Years 1-10)													
Wastewater Treatment Plant Rehabilitation													
Town of Lake Lure													
Sequencing Batch Reactor													
Current Inflation Rate Based on Municipal Cost Index: 0.09%													EPA Discount Rate: 4.875%
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Fine Bubble Diffusers	\$3.50	EA	700	\$2,338	\$2,231	\$2,129	\$2,032	\$1,939	\$1,851	\$1,766	\$1,686	\$1,609	\$1,535
Submersible Pumps	\$200	EA	5	\$954	\$911	\$869	\$829	\$792	\$755	\$721	\$688	\$657	\$627
Blowers	\$500	EA	3	\$1,432	\$1,366	\$1,304	\$1,244	\$1,187	\$1,133	\$1,081	\$1,032	\$985	\$940
Influent Pumps	\$200	EA	3	\$573	\$546	\$522	\$498	\$475	\$453	\$433	\$413	\$394	\$376
Digester Diffusers	\$4	EA	32	\$122	\$117	\$111	\$106	\$101	\$97	\$92	\$88	\$84	\$80
Sludge Handling	\$255	DT	800	\$194,686	\$185,796	\$177,313	\$169,217	\$161,491	\$154,117	\$147,080	\$140,365	\$133,956	\$127,840
Tertiary Filters	\$2,500	EA	1	\$2,386	\$2,277	\$2,173	\$2,074	\$1,979	\$1,889	\$1,802	\$1,720	\$1,642	\$1,567
Additional O&M Cost	\$380	KGAL	500	\$181,325	\$173,046	\$165,145	\$157,604	\$150,408	\$143,541	\$136,987	\$130,732	\$124,763	\$119,066
Decanter	\$35	EA	2	\$67	\$64	\$61	\$58	\$55	\$53	\$50	\$48	\$46	\$44
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$383,882	\$366,354	\$349,627	\$333,663	\$318,428	\$303,889	\$290,014	\$276,772	\$264,135	\$252,075

Table 5.2.48 Present Value of Operations and Maintenance Costs (Years 11-20)														
Wastewater Treatment Plant Rehabilitation														
Town of Lake Lure														
Sequencing Batch Reactor														
Current Inflation Rate Based on Municipal Cost Index: 0.09%													EPA Discount Rate: 4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Fine Bubble Diffusers	3.50	EA	700	\$1,465	\$1,398	\$1,334	\$1,274	\$1,215	\$1,160	\$1,107	\$1,056	\$1,008	\$962	
Submersible Pumps	\$200	EA	5	\$598	\$571	\$545	\$520	\$496	\$473	\$452	\$431	\$411	\$393	
Blowers	\$500	EA	3	\$897	\$856	\$817	\$780	\$744	\$710	\$678	\$647	\$617	\$589	
Influent Pumps	\$200	EA	3	\$359	\$342	\$327	\$312	\$298	\$284	\$271	\$259	\$247	\$236	
Digester Diffusers	\$4	EA	32	\$77	\$73	\$70	\$67	\$63	\$61	\$58	\$55	\$53	\$50	
Tertiary Filters	\$2,500	EA	1	\$1,495	\$1,427	\$1,362	\$1,300	\$1,240	\$1,184	\$1,130	\$1,078	\$1,029	\$982	
Sludge Handling	\$255	DT	800	\$122,003	\$116,432	\$111,116	\$106,042	\$101,201	\$96,580	\$92,170	\$87,962	\$83,946	\$80,113	
Additional O&M Cost	\$380	KGAL	500	\$113,630	\$108,442	\$103,490	\$98,765	\$94,256	\$89,952	\$85,845	\$81,925	\$78,185	\$74,615	
Decanter	\$35	EA	2	\$42	\$40	\$38	\$36	\$35	\$33	\$32	\$30	\$29	\$27	
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$240,565	\$229,581	\$219,099	\$209,095	\$199,548	\$190,437	\$181,742	\$173,443	\$165,524	\$157,966	
												Total Present Value of Annual O&M Costs (Life of Project):		\$5,105,839

Table 5.2.49 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)															
Wastewater Treatment Plant Rehabilitation															
Town of Lake Lure															
Sequencing Batch Reactor															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Submersible Pumps	\$2,500	EA	8	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,420	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$14,420	\$0	\$0	\$0	

Table 5.2.50 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)															
Wastewater Treatment Plant Rehabilitation															
Town of Lake Lure															
Sequencing Batch Reactor															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Submersible Pumps	\$2,500	EA	8	\$0	\$0	\$0	\$10,396	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$10,396	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
				Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):										\$24,816	

5.4.3.2 Moving Bed Biofilm Reactor (MBBR) Alternative

The Moving Bed Reactor (MBBR) Alternative will ultimately involve modifications to all of the existing wastewater plant structures. Table 5.2.51 lists the expected capital costs associated with this alternative.

Table 5.2.51 Capital Costs Wastewater Treatment Plant Rehabilitation Town of Lake Lure				
Alternative:		Moving Bed Biofilm Reactor		
Project Administration (\$):		\$771,482		
Component	Unit Cost^a	Unit	Quantity	Total Cost
MBBR Equipment Package	\$100,000	LS	1	\$100,000
Equipment Installation	\$583,500	LS	1	\$583,500
Fine Screen Rehabilitation	\$15,000	LS	1	\$15,000
Grit Removal System	\$196,000	LS	1	\$196,000
Blower Package	\$150,000	LS	1	\$150,000
Digester, Piping, and Diffusers	\$100,000	LS	2	\$200,000
Excavation	\$100	SY	1,474	\$147,400
Rock Removal	\$250	CY	295	\$73,750
Stone backfill	\$150	TN	290	\$43,500
Cast-in-Place Concrete	\$500	SY	733	\$366,500
Yard Piping and Air Piping	\$860,000	LS	1	\$860,000
Clarifier	\$650,000	LS	2	\$1,300,000
Demo Existing Basin and Clarifier	\$500	SY	210	\$105,000
Rehabilitate Existing Structures	\$250,000	LS	1	\$250,000
Ex. PS and piping abandonment	\$35,000	EA	1	\$35,000
Submersible Pump Station	\$250,000	LS	1	\$250,000
^a Unit costs are in today's dollars, not future dollars.		Total Construction Cost:		\$4,675,650
		Construction Contingency Cost:		\$467,565
		Project Administration Cost:		\$771,482
		Total Capital Cost:		\$5,914,697

The vast majority of system components will have a life cycle of 20 years or less. The primary serviceable components of this alternative are the grit removal system, ultraviolet bulbs, diffusers, and clarifier coating. An additional serviceable component of this alternative is the electro-mechanical systems including the pumps and generators, and associated controls. Table 5.2.52 lists the cost life cycle assumptions.

Table 5.2.52 Project Cost Life Cycle Assumptions Wastewater Treatment Plant Rehabilitation Town of Lake Lure			
Moving Bed Biofilm Reactor			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Fine Screen	20	Y	Typical Service Life
Grit Removal System	20	Y	Mechanical/Electrical Equipment
Blower Package	20	Y	Typical Service Life of Blowers
Digester, Piping, and Diffusers	5	Y	Typical Service Life of Diffusers
Yard Piping and Air Piping	50	N	Long-term Endurance with no Corrosion
Submersible Pump Station	15	Y	Typical Service Life of Pumps
Blower Package	20	Y	Typical Service Life
Clarifier	20	Y	Coating Service Life

†Period for replacement would be Years 1 through 20 only.

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$0.90 per pump station per day, there are substantial future costs that should be accounted for. Additional components that will require replacements and maintenance include the fine screen, grit removal system, ultraviolet bulbs, and diffusers. Equipment replacement costs are as identified in Table 5.2.53 through 5.2.56, and anticipated O&M costs are as identified in Tables 5.2.57 and 5.2.58. Table 5.2.59 and 5.2.60 identify intermittent costs, namely mechanical equipment services.

**Table 5.2.53 Replacement Costs (Years 1 to 5)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Moving Bed Biofilm Reactor								
Current Inflation Rate based on Construction Cost Index:			2.97%			EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blowers	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$876
Fine Bubble Diffusers	\$10	EA	30	\$0	\$0	\$0	\$0	\$274
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$1,150

**Table 5.2.54 Replacement Costs (Years 6 to 10)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Moving Bed Biofilm Reactor

Current Inflation Rate based on Construction Cost Index:			2.97%			EPA Discount Rate:	4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blowers	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$799
Fine Bubble Diffusers	\$10	EA	30	\$0	\$0	\$0	\$0	\$250
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$124,913
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$0	\$0	\$0	\$125,963

**Table 5.2.55 Replacement Costs (Years 11 to 15)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Moving Bed Biofilm Reactor

Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blowers	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$730
Fine Bubble Diffusers	\$10	EA	30	\$0	\$0	\$0	\$0	\$228
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$189,984
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$0	\$190,941

**Table 5.2.56 Replacement Costs (Years 16 to 20)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Moving Bed Biofilm Reactor								
Current Inflation Rate based on Construction Cost Index:			2.97%			EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				16	17	18	19	20
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$81,484
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$135,922
Blowers	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$104,022
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$666
Fine Bubble Diffusers	\$10	EA	30	\$0	\$0	\$0	\$0	\$208
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$69,348
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$104,022
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$131,761
Total Present Value of Replacement Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$627,434
				Total Present Value of Replacement Costs (Life of Project):				\$945,488

Table 5.2.57 Present Value of Operations and Maintenance Costs (Years 1-10)													
Wastewater Treatment Plant Rehabilitation													
Town of Lake Lure													
Moving Bed Biofilm Reactor													
Current Inflation Rate Based on Municipal Cost Index: 0.09%													EPA Discount Rate: 4.875%
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Fine Bubble Diffusers	\$3.50	UNIT	30	\$100	\$96	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66
Submersible Pumps	\$200	EA	5	\$954	\$911	\$869	\$829	\$792	\$755	\$721	\$688	\$657	\$627
Blowers	\$500	EA	5	\$2,386	\$2,277	\$2,173	\$2,074	\$1,979	\$1,889	\$1,802	\$1,720	\$1,642	\$1,567
Influent Pumps	\$200	EA	3	\$573	\$546	\$522	\$498	\$475	\$453	\$433	\$413	\$394	\$376
Digester Diffusers	\$4.00	EA	64	\$244	\$233	\$223	\$212	\$203	\$193	\$185	\$176	\$168	\$160
Sludge Handling	\$255.00	D-LB	600	\$146,014	\$139,347	\$132,985	\$126,913	\$121,118	\$115,588	\$110,310	\$105,274	\$100,467	\$95,880
Additional O&M Cost	\$380	KGAL	500	\$181,325	\$173,046	\$165,145	\$157,604	\$150,408	\$143,541	\$136,987	\$130,732	\$124,763	\$119,066
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$331,596	\$316,456	\$302,007	\$288,217	\$275,058	\$262,499	\$250,513	\$239,075	\$228,159	\$217,742

Table 5.2.58 Present Value of Operations and Maintenance Costs (Years 11-20)													
Wastewater Treatment Plant Rehabilitation													
Town of Lake Lure													
Moving Bed Biofilm Reactor													
Current Inflation Rate Based on Municipal Cost Index: 0.09%													EPA Discount Rate: 4.875%
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				11	12	13	14	15	16	17	18	19	20
Fine Bubble Diffusers	3.50	UNIT	30	\$63	\$60	\$57	\$55	\$52	\$50	\$47	\$45	\$43	\$41
Submersible Pumps	\$200	EA	5	\$598	\$571	\$545	\$520	\$496	\$473	\$452	\$431	\$411	\$393
Blowers	500	EA	5	\$1,495	\$1,427	\$1,362	\$1,300	\$1,240	\$1,184	\$1,130	\$1,078	\$1,029	\$982
Influent Pumps	\$200	EA	3	\$359	\$342	\$327	\$312	\$298	\$284	\$271	\$259	\$247	\$236
Digester Diffusers	4.00	EA	64	\$153	\$146	\$139	\$133	\$127	\$121	\$116	\$110	\$105	\$101
Sludge Handling	255	D-LB	600	\$91,502	\$87,324	\$83,337	\$79,532	\$75,901	\$72,435	\$69,128	\$65,971	\$62,959	\$60,084
Additional O&M Cost	380	KGAL	500	\$113,630	\$108,442	\$103,490	\$98,765	\$94,256	\$89,952	\$85,845	\$81,925	\$78,185	\$74,615
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$207,800	\$198,312	\$189,257	\$180,616	\$172,369	\$164,499	\$156,988	\$149,820	\$142,979	\$136,451
												Total Present Value of Annual O&M Costs (Life of Project):	\$4,410,413

Table 5.2.59 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)															
Wastewater Treatment Plant Rehabilitation															
Town of Lake Lure															
Moving Bed Biofilm Reactor															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$0	\$0	\$0	\$3,605	\$0	\$0	\$0		
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$0	\$0	\$3,605	\$0	\$0	\$0		

Table 5.2.60 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)															
Wastewater Treatment Plant Rehabilitation															
Town of Lake Lure															
Moving Bed Biofilm Reactor															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$0		
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$0		
												Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):		\$6,204	

5.4.3.3 Integrated Fixed-Film Activated Sludge (IFAS) Alternative (Preferred)

The Integrated Fixed-Film Activated Sludge (IFAS) Alternative will ultimately involve modifications to all of the existing wastewater plant structures. Table 5.2.61 lists the expected capital costs associated with this alternative.

Table 5.2.61 Capital Costs Wastewater Treatment Plant Rehabilitation Town of Lake Lure				
Alternative:	Integrated Fixed-Film Activated Sludge (preferred)			
Project Administration (\$):	\$733,120			
Component	Unit Cost^a	Unit	Quantity	Total Cost
IFAS Equipment Package	\$100,000	LS	1	\$100,000
Equipment Installation	\$595,500	LS	1	\$595,500
Fine Screen Rehabilitation	\$15,000	LS	1	\$15,000
Grit Removal System	\$196,000	LS	1	\$196,000
Blower Package	\$162,000	LS	1	\$162,000
Digester Piping and Diffusers	\$100,000	LS	2	\$200,000
Excavation	\$100	SY	1,474	\$147,400
Rock Removal	\$250	CY	295	\$73,750
Stone backfill	\$150	TN	290	\$43,500
Cast-in-Place Concrete	\$500	SY	720	\$360,000
Yard Piping and Air Piping	\$610,000	LS	1	\$610,000
Clarifier	\$650,000	LS	2	\$1,300,000
Demolish Existing Basin	\$500	SY	210	\$105,000
Rehabilitate Existing Structures	\$250,000	LS	1	\$250,000
Ex. PS and piping abandonment	\$35,000	EA	1	\$35,000
Submersible Pump Station	\$250,000	LS	1	\$250,000
^a Unit costs are in today's dollars, not future dollars.	Total Construction Cost:			\$4,443,150
	Contingency Cost:			\$444,315
	Project Administration Cost:			\$733,120
	Total Capital Cost:			\$5,620,585

The vast majority of system components will have a life cycle of 20 years or less. The primary serviceable components of this alternative are the grit removal system, ultraviolet bulbs, diffusers, and clarifier coating. An additional serviceable component of this alternative is the electro-mechanical systems including the pumps and generators, and associated controls. Table 5.2.62 lists the cost life cycle assumptions.

Table 5.2.62 Project Cost Life Cycle Assumptions Wastewater Treatment Plant Rehabilitation Town of Lake Lure			
Integrated Fixed-Film Activated Sludge (Preferred)			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Fine Screen	20	Y	Typical Service Life
Grit Removal System	20	Y	Mechanical/Electrical Equipment
Blower Package	20	Y	Typical Service Life of Blowers
Digester, Piping, and Diffusers	5	Y	Typical Service Life of Diffusers
Yard Piping and Air Piping	50	N	Long-term Endurance with no Corrosion
Submersible Pump Station	15	Y	Typical Service Life of Pumps
Clarifier	20	Y	Typical Service Life of Coating
†Period for replacement would be Years 1 through 20 only.			

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$0.90 per pump station per day, there are substantial future costs that should be accounted for. Additional components that will require replacements and maintenance include the fine screen, grit removal system, ultraviolet bulbs, and diffusers. Equipment replacement costs are as identified in Table 5.2.63 through 5.2.66, and anticipated O&M costs are as identified in Tables 5.2.67 and 5.2.68. Table 5.2.69 and 5.2.70, namely mechanical equipment services.

**Table 5.2.63 Replacement Costs (Years 1 to 5)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Integrated Fixed-Film Activated Sludge (preferred)								
Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$876
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$365
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$1,241

**Table 5.2.64 Replacement Costs (Years 6 to 10)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Integrated Fixed-Film Activated Sludge (preferred)

Current Inflation Rate based on Construction Cost Index:		2.97%			EPA Discount Rate:	4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$799
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$333
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$124,913
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$0	\$0	\$0	\$126,046

**Table 5.2.65 Replacement Costs (Years 11 to 15)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure**

Integrated Fixed-Film Activated Sludge (preferred)

Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$730
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$304
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$189,984
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$0	\$191,017

Table 5.2.66 Replacement Costs (Years 16 to 20)
Wastewater Treatment Plant Rehabilitation
Town of Lake Lure

Integrated Fixed-Film Activated Sludge (preferred)

Current Inflation Rate based on Construction Cost Index:		2.97%				EPA Discount Rate:		4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				16	17	18	19	20
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$81,484
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$135,922
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$104,022
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$666
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$277
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$69,348
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$104,022
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$131,761
Total Present Value of Replacement Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$627,503
				Total Present Value of Replacement Costs (Life of Project):				\$945,807

Table 5.2.67 Present Value of Operations and Maintenance Costs (Years 1-10)														
Wastewater Treatment Plant Rehabilitation														
Town of Lake Lure														
Integrated Fixed-Film Activated Sludge (preferred)														
Current Inflation Rate Based on Municipal Cost Index:			0.09%										EPA Discount Rate:	4.875%
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				1	2	3	4	5	6	7	8	9	10	
Fine Bubble Diffusers	\$3.50	EA	40	\$134	\$128	\$122	\$116	\$111	\$106	\$101	\$96	\$92	\$88	
Submersible Pumps	\$200	EA	5	\$954	\$911	\$869	\$829	\$792	\$755	\$721	\$688	\$657	\$627	
Blowers	\$500	EA	5	\$2,386	\$2,277	\$2,173	\$2,074	\$1,979	\$1,889	\$1,802	\$1,720	\$1,642	\$1,567	
Influent Pumps	\$200	EA	3	\$573	\$546	\$522	\$498	\$475	\$453	\$433	\$413	\$394	\$376	
Digester Diffusers	\$4.00	EA	64	\$244	\$233	\$223	\$212	\$203	\$193	\$185	\$176	\$168	\$160	
Sludge Handling	\$255	D-LB	600	\$146,014	\$139,347	\$132,985	\$126,913	\$121,118	\$115,588	\$110,310	\$105,274	\$100,467	\$95,880	
Additional O&M Cost	\$380	KGAL	500	\$181,325	\$173,046	\$165,145	\$157,604	\$150,408	\$143,541	\$136,987	\$130,732	\$124,763	\$119,066	
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$331,630	\$316,488	\$302,037	\$288,246	\$275,085	\$262,525	\$250,539	\$239,099	\$228,182	\$217,764	

Table 5.2.68 Present Value of Operations and Maintenance Costs (Years 11-20)														
Wastewater Treatment Plant Rehabilitation														
Town of Lake Lure														
Integrated Fixed-Film Activated Sludge (preferred)														
Current Inflation Rate Based on Municipal Cost Index:			0.09%										EPA Discount Rate:	4.875%
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Fine Bubble Diffusers	\$3.50	EA	40	\$84	\$80	\$76	\$73	\$69	\$66	\$63	\$60	\$58	\$55	
Submersible Pumps	\$200	EA	5	\$598	\$571	\$545	\$520	\$496	\$473	\$452	\$431	\$411	\$393	
Blowers	\$500	EA	5	\$1,495	\$1,427	\$1,362	\$1,300	\$1,240	\$1,184	\$1,130	\$1,078	\$1,029	\$982	
Influent Pumps	\$200	EA	3	\$359	\$342	\$327	\$312	\$298	\$284	\$271	\$259	\$247	\$236	
Digester Diffusers	\$4.00	EA	64	\$153	\$146	\$139	\$133	\$127	\$121	\$116	\$110	\$105	\$101	
Sludge Handling	\$255	D-LB	600	\$91,502	\$87,324	\$83,337	\$79,532	\$75,901	\$72,435	\$69,128	\$65,971	\$62,959	\$60,084	
Additional O&M Cost	\$380	KGAL	500	\$113,630	\$108,442	\$103,490	\$98,765	\$94,256	\$89,952	\$85,845	\$81,925	\$78,185	\$74,615	
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$207,821	\$198,332	\$189,276	\$180,634	\$172,386	\$164,515	\$157,004	\$149,835	\$142,994	\$136,465	
										Total Present Value of Annual O&M Costs (Life of Project):				\$4,410,858

Table 5.2.69 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)															
Wastewater Treatment Plant Rehabilitation															
Town of Lake Lure															
Integrated Fixed-Film Activated Sludge (preferred)															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,605	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,605	\$0	\$0	\$0	

Table 5.2.70 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)															
Wastewater Treatment Plant Rehabilitation															
Town of Lake Lure															
Integrated Fixed-Film Activated Sludge (preferred)															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
				Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):										\$6,204	

5.4.4 Subaqueous Sanitary Sewer (SASS) and Wastewater Treatment Plant (Plant) Combined Alternatives

The collection and treatment systems for the Town of Lake Lure both need to be replaced and rehabilitated. The proposed project involves not only work on the SASS, but also at the Plant. In this section, the present worth analysis will be done for the complete proposed project that combines the preferred SASS Alternate and the preferred Plant Alternative.

5.4.4.1 Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project)

The Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) is a combination of the Backshore Gravity/Lift Station Alternative and the Integrated Fixed-Film Activated Sludge Alternative. This alternative will ultimately involve work to replace the existing SASS and includes the installation of a Sewer Access Valve, which enables construction to occur 'in the dry', approximately 101,000 linear feet of HDPE sewer main, approximately 110 manholes (a portion of which would be pump stations), and 15 lift stations. This alternate also includes work to be completed at the Plant and involves modifications on all of the existing wastewater plant structures. Table 5.2.71 lists the expected capital costs associated with this alternative.

**Table 5.2.71 Capital Costs
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Collection System and Treatment Rehabilitation and Replacement				
Project Administration:	\$8,149,664			
Component	Unit Cost^a	Unit	Quantity	Total Cost
Sewer Access Valve	\$2,173,913	EA	1	\$2,173,913
4' dia. HDPE Manholes	\$30,000	EA	94	\$2,820,000
6' dia. HDPE Pump Station Manholes	\$45,000	EA	15	\$675,000
Permanent Pump Station Equipment	\$20,000	EA	15	\$300,000
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$1,050,000
4" HDPE Service Connections	\$188	LF	7,200	\$1,350,432
6" HDPE Gravity Sewer	\$288	LF	4,500	\$1,294,200
8" HDPE Gravity Sewer	\$271	LF	39,300	\$10,655,409
10" HDPE Gravity Sewer	\$370	LF	19,900	\$7,362,602
12" HDPE Gravity Sewer	\$369	LF	18,200	\$6,712,888
14" HDPE Gravity Sewer	\$394	LF	15,300	\$6,025,752
16" HDPE Gravity Sewer	\$470	LF	2,300	\$1,080,057
10" HDD across Bufflao Creek branch of Lake	\$650	LF	2,700	\$1,755,000
12" HDD across Cane Creek branch of Lake	\$780	LF	1,700	\$1,326,000
IFAS Equipment Package	\$100,000	LS	1	\$100,000
Equipment Installation	\$595,500	LS	1	\$595,500
Fine Screen Rehabilitation	\$15,000	LS	1	\$15,000
Grit Removal System	\$196,000	LS	1	\$196,000
Blower Package	\$162,000	LS	1	\$162,000
Digester Piping and Diffusers	\$100,000	EA	2	\$200,000
Excavation	\$100	SY	1,474	\$147,400
Rock Removal	\$250	CY	295	\$73,750
Stone backfill	\$150	TN	290	\$43,500
Cast-in-Place Concrete	\$500	SY	720	\$360,000
Yard Piping and Air Piping	\$610,000	LS	1	\$610,000
Clarifier	\$650,000	EA	2	\$1,300,000
Demolish Existing Basin and Clarifier	\$500	SY	215	\$107,500
Rehabilitate Existing Structures	\$250,000	LS	1	\$250,000
Submersible Pump Station	\$250,000	LS	1	\$250,000
Manhole Rehabilitation	\$10,000	EA	40	\$400,000
^a Unit costs are in today's dollars, not future dollars.	Total Construction Cost:			\$49,391,903
	Construction Contingency Cost:			\$4,939,190
	Project Administration Cost:			\$8,149,664
	Total Capital Cost:			\$62,480,757

The vast majority of system components associated with the SASS replacement will have a life cycle substantially exceeding 30 years. HDPE pipe, for example, can be shown to

have a historical successful service life of 50 years or more, and studies suggest that it is likely to have a 100-year or greater service life (though the material in pipe form has only been in existence since 1955). The primary serviceable components of this alternative are the sewer access valve, the electro-mechanical systems including the pumps and generators, and associated controls.

The vast majority of system components associated with the Plant work will have a life cycle of 20 years or less. The primary serviceable components of this alternative are the grit removal system, ultraviolet bulbs, diffusers, and clarifier coating. An additional serviceable component of this alternative is the electro-mechanical systems including the pumps and generators, and associated controls. Table 5.2.72 lists the cost life cycle assumptions.

Table 5.2.72 Project Cost Life Cycle Assumptions Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure Collection System and Treatment Rehabilitation and Replacement			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Sewer Access Valve	75	N	Typical Service Life
4' dia. HDPE Manholes	100	N	Long-term endurance with no corrosion
6' dia. HDPE Pump Station Manholes	100	N	
Permanent Pump Station Equipment	40	N	HDPE/SS/Buried Components
Pump Station Pumps, Electrical, Generator	15	Y	Mechanical/Electrical Equipment
4" HDPE Service Connections	100	N	Long-term endurance with no corrosion
6" HDPE Gravity Sewer	100	N	
8" HDPE Gravity Sewer	100	N	
10" HDPE Gravity Sewer	100	N	
12" HDPE Gravity Sewer	100	N	
14" HDPE Gravity Sewer	100	N	
16" HDPE Gravity Sewer	100	N	
10" HDD across Bufflao Creek branch of Lake	100	N	
12" HDD across Cane Creek branch of Lake	100	N	
Fine Screen	5	Y	
Grit Removal System	20	Y	Mechanical/Electrical Equipment
Blower Package	20	Y	Typical Service Life of Blowers
Digester Diffusers	25	N	Typical Service Life of Diffusers
Fine Bubble Diffusers	5	Y	Typical Service Life of Diffusers
Yard Piping and Air Piping	50	N	Long-term endurance with no corrosion
Submersible Pump Station	15	Y	Typical Service Life of Pumps
Clarifier Coating	20	Y	Typical Service Life of Coating

†Period for replacement would be Years 1 through 20 only.

Given anticipated maintenance of pumps and generators (anticipated every approximately 5 years) and replacements (expected at 15 years), and power consumption costs averaging \$0.90 per pump station per day, there are substantial future costs that should

be accounted for. Additional components that will require replacements and maintenance include the fine screen, grit removal system, ultraviolet bulbs, and diffusers. Equipment replacement costs are as identified in Table 5.2.73 through 5.2.76, and anticipated O&M costs are as identified in Tables 5.2.77 and 5.2.78. Table 5.2.79 and 5.2.80 identify intermittent costs, namely mechanical equipment services.

Table 5.2.73 Replacement Costs (Years 1 to 5)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure

Collection System and Treatment Rehabilitation and Replacement

Current Inflation Rate based on Construction Cost Index: 2.97%

EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	94	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	EA	15	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	EA	15	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$369	LF	18,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0
10" HDD across Bufflao Creek branch of Lake	\$650	LF	2,700	\$0	\$0	\$0	\$0	\$0
12" HDD across Cane Creek branch of Lake	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$876
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$365
Yard Piping and Air Piping	\$100,000	LS	1	\$0	\$0	\$0	\$0	\$0
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$1,241

**Table 5.2.74 Replacement Costs (Years 6 to 10)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Collection System and Treatment Rehabilitation and Replacement								
Current Inflation Rate based on Construction Cost Index:				2.97%			EPA Discount Rate:	4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	94	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	EA	15	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	EA	15	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$369	LF	18,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0
10" HDD across Bufflao Creek branch of Lake	\$650	LF	2,700	\$0	\$0	\$0	\$0	\$0
12" HDD across Cane Creek branch of Lake	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$799
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$333
Yard Piping and Air Piping	\$100,000	LS	1	\$0	\$0	\$0	\$0	\$0
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$124,913
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$0	\$0	\$0	\$126,046

**Table 5.2.75 Replacement Costs (Years 11 to 15)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Collection System and Treatment Rehabilitation and Replacement								
Current Inflation Rate based on Construction Cost Index: 2.97%						EPA Discount Rate: 4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	94	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	EA	15	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	EA	15	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$797,931
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$369	LF	18,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0
10" HDD across Bufflao Creek branch of Lake	\$650	LF	2,700	\$0	\$0	\$0	\$0	\$0
12" HDD across Cane Creek branch of Lake	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$730
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$304
Yard Piping and Air Piping	\$100,000	LS	1	\$0	\$0	\$0	\$0	\$0
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$0
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$189,984
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$0
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$0	\$988,948

Table 5.2.76 Replacement Costs (Years 16 to 20)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure

Collection System and Treatment Rehabilitation and Replacement

Current Inflation Rate based on Construction Cost Index: 2.97% EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				16	17	18	19	20
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	94	\$0	\$0	\$0	\$0	\$0
6' dia. HDPE Pump Station Manholes	\$45,000	EA	15	\$0	\$0	\$0	\$0	\$0
Permanent Pump Station Equipment	\$20,000	EA	15	\$0	\$0	\$0	\$0	\$0
Pump Station Pumps, Electrical, Generator	\$70,000	EA	15	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	7,200	\$0	\$0	\$0	\$0	\$0
6" HDPE Gravity Sewer	\$288	LF	4,500	\$0	\$0	\$0	\$0	\$0
8" HDPE Gravity Sewer	\$271	LF	39,300	\$0	\$0	\$0	\$0	\$0
10" HDPE Gravity Sewer	\$370	LF	19,900	\$0	\$0	\$0	\$0	\$0
12" HDPE Gravity Sewer	\$369	LF	18,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	15,300	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	2,300	\$0	\$0	\$0	\$0	\$0
10" HDD across Bufflao Creek branch of Lake	\$650	LF	2,700	\$0	\$0	\$0	\$0	\$0
12" HDD across Cane Creek branch of Lake	\$780	LF	1,700	\$0	\$0	\$0	\$0	\$0
Fine Screen	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$81,484
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$135,922
Blower Package	\$150,000	LS	1	\$0	\$0	\$0	\$0	\$104,022
Digester Diffusers	\$15	EA	64	\$0	\$0	\$0	\$0	\$666
Fine Bubble Diffusers	\$10	EA	40	\$0	\$0	\$0	\$0	\$277
Yard Piping and Air Piping	\$100,000	LS	1	\$0	\$0	\$0	\$0	\$0
Valves	\$100,000	EA	1	\$0	\$0	\$0	\$0	\$69,348
Submersible Pumps	\$50,000	EA	5	\$0	\$0	\$0	\$0	\$0
Influent Pumps	\$50,000	EA	3	\$0	\$0	\$0	\$0	\$104,022
Clarifier Coating	\$190,000	LS	1	\$0	\$0	\$0	\$0	\$131,761
Total Present Value of Replacement Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$627,503
				Total Present Value of Replacement Costs (Life of Project):				\$1,743,738

Table 5.2.77 Present Value of Operations and Maintenance Costs (Years 1-10)													
Lake Lure Subaqueous Sanitary Sewer Replacement													
Town of Lake Lure													
Collection System and Treatment Rehabilitation and Replacement													
Current Inflation Rate Based on Municipal Cost Index: 0.09%													EPA Discount Rate: 4.875%
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Sewer Access Valve	\$100.00	EA	1	\$95	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66	\$63
Pumps - Electricity (avg \$0.90/day per LS)	\$329	EA	15	\$4,710	\$4,495	\$4,289	\$4,094	\$3,907	\$3,728	\$3,558	\$3,396	\$3,241	\$3,093
Fine Bubble Diffusers	\$3.50	EA	40	\$134	\$128	\$122	\$116	\$111	\$106	\$101	\$96	\$92	\$88
Submersible Pumps	\$200	EA	5	\$954	\$911	\$869	\$829	\$792	\$755	\$721	\$688	\$657	\$627
Blowers	\$500	EA	5	\$2,386	\$2,277	\$2,173	\$2,074	\$1,979	\$1,889	\$1,802	\$1,720	\$1,642	\$1,567
Digester Diffusers	\$4.00	EA	64	\$244	\$233	\$223	\$212	\$203	\$193	\$185	\$176	\$168	\$160
Sludge Handling	\$255	D-LB	600	\$146,014	\$139,347	\$132,985	\$126,913	\$121,118	\$115,588	\$110,310	\$105,274	\$100,467	\$95,880
Additional O&M Cost	\$380.00	KGAL	500	\$181,325	\$173,046	\$165,145	\$157,604	\$150,408	\$143,541	\$136,987	\$130,732	\$124,763	\$119,066
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$335,862	\$320,527	\$305,892	\$291,925	\$278,596	\$265,876	\$253,736	\$242,151	\$231,094	\$220,543

Table 5.2.78 Present Value of Operations and Maintenance Costs (Years 11-20)														
Lake Lure Subaqueous Sanitary Sewer Replacement														
Town of Lake Lure														
Collection System and Treatment Rehabilitation and Replacement														
Current Inflation Rate Based on Municipal Cost Index: 0.09%													EPA Discount Rate: 4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Sewer Access Valve	\$100	EA	1	\$60	\$57	\$54	\$52	\$50	\$47	\$45	\$43	\$41	\$39	
Pumps - Electricity (avg \$0.90/day per LS)	\$329	EA	15	\$2,951	\$2,817	\$2,688	\$2,565	\$2,448	\$2,336	\$2,230	\$2,128	\$2,031	\$1,938	
Fine Bubble Diffusers	\$3.50	EA	40	\$84	\$80	\$76	\$73	\$69	\$66	\$63	\$60	\$58	\$55	
Submersible Pumps	\$200	EA	5	\$598	\$571	\$545	\$520	\$496	\$473	\$452	\$431	\$411	\$393	
Blowers	\$500	EA	5	\$1,495	\$1,427	\$1,362	\$1,300	\$1,240	\$1,184	\$1,130	\$1,078	\$1,029	\$982	
Digester Diffusers	\$4.00	EA	64	\$153	\$146	\$139	\$133	\$127	\$121	\$116	\$110	\$105	\$101	
Sludge Handling	\$255	D-LB	600	\$91,502	\$87,324	\$83,337	\$79,532	\$75,901	\$72,435	\$69,128	\$65,971	\$62,959	\$60,084	
Additional O&M Cost	\$380	KGAL	500	\$113,630	\$108,442	\$103,490	\$98,765	\$94,256	\$89,952	\$85,845	\$81,925	\$78,185	\$74,615	
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$210,473	\$200,863	\$191,692	\$182,939	\$174,587	\$166,615	\$159,008	\$151,747	\$144,819	\$138,207	
										Total Present Value of Annual O&M Costs (Life of Project):				\$4,467,152

Table 5.2.79 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)															
Lake Lure Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Collection System and Treatment Rehabilitation and Replacement															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Pumps & Gensets - Service/Rebuild	\$1,500	EA	15	\$0	\$0	\$0	\$0	\$17,811	\$0	\$0	\$0	\$0	\$14,100		
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$0	\$0	\$0	\$3,605	\$0	\$0	\$0		
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$3,605	\$0	\$0	\$0	

Table 5.2.80 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)															
Lake Lure Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Collection System and Treatment Rehabilitation and Replacement															
Current Inflation Rate Based on Municipal Cost Index:				0.09%								EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Pumps & Gensets - Service/Rebuild	\$1,500	EA	15	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,836	
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
				Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):										\$6,204	

5.4.4.2 Collection System and Treatment Rehabilitation and Replacement Phase 1 Alternative

The Collection System and Treatment Rehabilitation and Replacement Alternative (Complete Project) is a combination of the Backshore Gravity/Lift Station Alternative and the Integrated Fixed-Film Activated Sludge Alternative. This alternative includes work to replace the Subaqueous Sewer System (SASS) and work at the Wastewater Treatment Plant (Plant). The extent of work associated with this phase is based on the available funding and on the sequence of work needed to provide for immediate needs as well as beginning the long-term solution.

The first component to this alternate includes work to replace the existing SASS and includes the installation of a Sewer Access Valve, which enables construction to occur 'in the dry'. Phase 1 of this alternative (the portion that can be addressed with the available SRF funds) begins at the lake's dam and will install gravity sewer and manholes along the north shoreline for approximately 8,500 linear feet and the south shoreline for approximately 7,000 linear feet. This first Phase is not expected to include any lift stations, and it will eliminate reliance on the existing system for all properties immediately adjacent to the Phase 1 construction.

The second component to this alternate includes work to be completed at the Plant. Phase 1 of the project would include the correction of the fine screen, the installation of a grit removal system, and the replacement of the existing digester with a new one of the same size. The Phase 1 project specifically deals with improving solids handling of the existing physical/chemical process that would be maintained during the SASS replacement. Table 5.2.81 lists the expected capital costs associated with this alternative.

Table 5.2.81 Capital Costs				
Lake Lure Subaqueous Sanitary Sewer Replacement				
Town of Lake Lure				
Alternative:	Collection System and Treatment Rehabilitation and Replacement Phase 1			
Project Administration (\$):	\$1,630,435			
Component	Unit Cost^a	Unit	Quantity	Total Cost
Sewer Access Valve	\$2,173,913	EA	1	\$2,173,913
4' dia. HDPE Manholes	\$30,000	EA	18	\$540,000
4" HDPE Service Connections	\$188	LF	1,200	\$225,072
14" HDPE Gravity Sewer	\$394	LF	13,497	\$5,315,658
16" HDPE Gravity Sewer	\$470	LF	1,950	\$915,701
Fine Screen Rehabilitation	\$15,079	LS	1	\$15,079
Grit Removal System	\$196,000	LD	1	\$196,000
Digester Piping and Diffusers	\$100,000	LS	1	\$100,000
Manhole Rehabilitation	\$10,000	EA	40	\$400,000
Total Construction Cost:				\$9,881,423
Construction Contingency Cost:				\$988,142
Project Administration Cost:				\$1,630,435
Total Capital Cost:				\$12,500,000

The vast majority of system components associated with the SASS replacement will have a life cycle substantially exceeding 30 years. HDPE pipe, for example, can be shown to have a historical successful service life of 50 years or more, and studies suggest that it is likely to have a 100-year or greater service life (though the material in pipe form has only been in existence since 1955). The primary serviceable components of this alternative are the sewer access valve, the electro-mechanical systems including the pumps and generators, and associated controls.

The vast majority of system components associated with the Plant work will have a life cycle of 20 years or less. The primary serviceable components of this alternative are the fine screen, the grit removal system, diffusers, and manhole coating. Table 5.2.82 lists the cost life cycle assumptions.

Table 5.2.82 Project Cost Life Cycle Assumptions Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure			
Collection System and Treatment Rehabilitation and Replacement Phase 1			
Component	Expected Life Cycle	Replacement Expected?†	Rationale for Expected Life Cycle
Sewer Access Valve	75	N	Typical Service Life
4' dia. HDPE Manholes	100	N	Long-term Endurance with no Corrosion
4" HDPE Service Connections	100	N	
14" HDPE Gravity Sewer	100	N	
16" HDPE Gravity Sewer	100	N	
Fine Screen Rehabilitation	20	Y	Typical Service Life
Grit Removal System	20	Y	Mechanical/Electrical Equipment
Digester Diffusers	5	Y	Typical Service Life of Diffusers
Manhole Rehabilitation	20	Y	Coating Service Life
†Period for replacement would be Years 1 through 20 only.			

Anticipated replacements and maintenance include the fine screen, grit removal system, ultraviolet bulbs, and diffusers. Equipment replacement costs are as identified in Table 5.2.83 through 5.2.86, and anticipated O&M costs are as identified in Tables 5.2.87 and 5.2.88. Table 5.2.89 and 5.2.90 identify intermittent costs, namely mechanical equipment services.

**Table 5.2.83 Replacement Costs (Years 1 to 5)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Collection System and Treatment Rehabilitation and Replacement Phase 1

Current Inflation Rate based on Construction Cost		2.97%			EPA Discount Rate:		4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				1	2	3	4	5
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	18	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	1,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	13,497	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	1,950	\$0	\$0	\$0	\$0	\$0
Fine Screen Rehabilitation	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	32	\$0	\$0	\$0	\$0	\$438
Manhole Rehabilitation	\$10,000	EA	40	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 1 to 5):				\$0	\$0	\$0	\$0	\$438

**Table 5.2.84 Replacement Costs (Years 6 to 10)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Collection System and Treatment Rehabilitation and Replacement Phase 1								
Current Inflation Rate based on Construction Cost				2.97%			EPA Discount Rate:	4.875%
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				6	7	8	9	10
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	18	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	1,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	13,497	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	1,950	\$0	\$0	\$0	\$0	\$0
Fine Screen Rehabilitation	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	32	\$0	\$0	\$0	\$0	\$400
Manhole Rehabilitation	\$10,000	EA	40	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacement Costs (Years 6 to 10):				\$0	\$0	\$0	\$0	\$400

**Table 5.2.85 Replacement Costs (Years 11 to 15)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Collection System and Treatment Rehabilitation and Replacement Phase 1

Current Inflation Rate based on Construction Cost Index:		2.97%		EPA Discount Rate: 4.875%				
Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				11	12	13	14	15
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	18	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	1,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	13,497	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	1,950	\$0	\$0	\$0	\$0	\$0
Fine Screen Rehabilitation	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$0
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$0
Digester Diffusers	\$15	EA	32	\$0	\$0	\$0	\$0	\$365
Manhole Rehabilitation	\$10,000	EA	40	\$0	\$0	\$0	\$0	\$303,974
Total Present Value of Replacement Costs (Years 11 to 15):				\$0	\$0	\$0	\$0	\$304,338

**Table 5.2.86 Replacement Costs (Years 16 to 20)
Lake Lure Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Collection System and Treatment Rehabilitation and Replacement Phase 1

Current Inflation Rate based on Construction Cost Index: 2.97% EPA Discount Rate: 4.875%

Component	Unit Cost	Unit	Quantity	Present Value of Replacement Costs in Year:				
				16	17	18	19	20
Sewer Access Valve	\$2,173,913	EA	1	\$0	\$0	\$0	\$0	\$0
4' dia. HDPE Manholes	\$30,000	EA	18	\$0	\$0	\$0	\$0	\$0
4" HDPE Service Connections	\$188	LF	1,200	\$0	\$0	\$0	\$0	\$0
14" HDPE Gravity Sewer	\$394	LF	13,497	\$0	\$0	\$0	\$0	\$0
16" HDPE Gravity Sewer	\$470	LF	1,950	\$0	\$0	\$0	\$0	\$0
Fine Screen Rehabilitation	\$117,500	LS	1	\$0	\$0	\$0	\$0	\$81,484
Grit Removal System	\$196,000	LS	1	\$0	\$0	\$0	\$0	\$135,922
Digester Diffusers	\$15	EA	32	\$0	\$0	\$0	\$0	\$333
Manhole Rehabilitation	\$10,000	EA	40	\$0	\$0	\$0	\$0	\$0
Total Present Value of Replacment Costs (Years 16 to 20):				\$0	\$0	\$0	\$0	\$217,739
				Total Present Value of Replacement Costs (Life of Project):				\$522,915

Table 5.2.87 Present Value of Operations and Maintenance Costs (Years 1-10)													
Wastewater Treatment Plant Rehabilitation													
Town of Lake Lure													
Collection System and Treatment Rehabilitation and Replacement Phase 1													
Current Inflation Rate Based on Municipal Cost Index: 0.09%												EPA Discount Rate: 4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:									
				1	2	3	4	5	6	7	8	9	10
Pumps - Electricity (avg \$1.00/day per LS)	\$365	EA	22	\$7,663	\$7,313	\$6,980	\$6,661	\$6,357	\$6,066	\$5,789	\$5,525	\$5,273	\$5,032
Sewer Access Valve	\$100	EA	1	\$95	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66	\$63
Fine Bubble Diffusers	\$3.50	EA	30	\$100	\$96	\$91	\$87	\$83	\$79	\$76	\$72	\$69	\$66
Blowers	\$500	EA	5	\$2,386	\$2,277	\$2,173	\$2,074	\$1,979	\$1,889	\$1,802	\$1,720	\$1,642	\$1,567
Digester Diffusers	\$4.00	EA	32	\$122	\$117	\$111	\$106	\$101	\$97	\$92	\$88	\$84	\$80
Sludge Handling	\$255.00	D-LB	600	\$146,014	\$139,347	\$132,985	\$126,913	\$121,118	\$115,588	\$110,310	\$105,274	\$100,467	\$95,880
Additional O&M Cost	\$380	KGAL	500	\$181,325	\$173,046	\$165,145	\$157,604	\$150,408	\$143,541	\$136,987	\$130,732	\$124,763	\$119,066
Total Present Value of Yearly O&M Expenses (Years 1-10):				\$337,706	\$322,287	\$307,571	\$293,528	\$280,126	\$267,335	\$255,129	\$243,480	\$232,363	\$221,754

Table 5.2.88 Present Value of Operations and Maintenance Costs (Years 11-20)														
Wastewater Treatment Plant Rehabilitation														
Town of Lake Lure														
Collection System and Treatment Rehabilitation and Replacement Phase 1														
Current Inflation Rate Based on Municipal Cost Index: 0.09%												EPA Discount Rate: 4.875%		
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:										
				11	12	13	14	15	16	17	18	19	20	
Pumps - Electricity (avg \$1.00/day per LS)	\$365	EA	22	\$4,802	\$4,583	\$4,374	\$4,174	\$3,984	\$3,802	\$3,628	\$3,462	\$3,304	\$3,153	
Sewer Access Valve	\$100	EA	1	\$60	\$57	\$54	\$52	\$50	\$47	\$45	\$43	\$41	\$39	
Fine Bubble Diffusers	\$3.50	EA	30	\$63	\$60	\$57	\$55	\$52	\$50	\$47	\$45	\$43	\$41	
Blowers	\$500	EA	5	\$1,495	\$1,427	\$1,362	\$1,300	\$1,240	\$1,184	\$1,130	\$1,078	\$1,029	\$982	
Digester Diffusers	\$4.00	EA	32	\$77	\$73	\$70	\$67	\$63	\$61	\$58	\$55	\$53	\$50	
Sludge Handling	\$255	D-LB	600	\$91,502	\$87,324	\$83,337	\$79,532	\$75,901	\$72,435	\$69,128	\$65,971	\$62,959	\$60,084	
Additional O&M Cost	\$380	KGAL	500	\$113,630	\$108,442	\$103,490	\$98,765	\$94,256	\$89,952	\$85,845	\$81,925	\$78,185	\$74,615	
Total Present Value of Yearly O&M Expenses (Years 11-20):				\$211,629	\$201,966	\$192,744	\$183,944	\$175,545	\$167,530	\$159,881	\$152,581	\$145,614	\$138,965	
												Total Present Value of Annual O&M Costs (Life of Project):		\$4,491,676

Table 5.2.89 Present Value of Intermittent Operations and Maintenance Costs (Years 1-10)															
Lake Lure Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Collection System and Treatment Rehabilitation and Replacement Phase 1															
Current Inflation Rate Based on Municipal Cost Index: 0.09%														EPA Discount Rate: 4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				1	2	3	4	5	6	7	8	9	10		
Pumps & Gensets - Service/Rebuild	\$1,500	EA	15	\$0	\$0	\$0	\$0	\$17,811	\$0	\$0	\$0	\$0	\$14,100		
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$0	\$0	\$0	\$3,605	\$0	\$0	\$0		
Total Present Value of Intermittent Operations & Maintenance Costs (Years 1-10):				\$0	\$0	\$0	\$0	\$17,811	\$0	\$3,605	\$0	\$0	\$14,100		

Table 5.2.90 Present Value of Intermittent Operations and Maintenance Costs (Years 11-20)															
Lake Lure Subaqueous Sanitary Sewer Replacement															
Town of Lake Lure															
Collection System and Treatment Rehabilitation and Replacement Phase 1															
Current Inflation Rate Based on Municipal Cost Index: 0.09%														EPA Discount Rate: 4.875%	
Component	Unit Cost	Unit	Quantity	Present Value of O&M Costs for Year:											
				11	12	13	14	15	16	17	18	19	20		
Pumps & Gensets - Service/Rebuild	\$1,500	EA	15	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,836		
Pump Rebuilds	\$2,500	EA	2	\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$0		
Total Present Value of Intermittent Operations & Maintenance Costs (Years 11-20):				\$0	\$0	\$0	\$2,599	\$0	\$0	\$0	\$0	\$0	\$8,836		
				Total Present Value of Intermittent Operations & Maintenance Costs (Life of Project):										\$46,951	

5.5 Total Present Worth for Feasible Alternatives

5.5.1 Subaqueous Sanitary Sewer (SASS) Alternatives

The estimated capital cost for the Backshore Gravity/Lift Stations Alternate (Preferred) is \$56,395,285 with a replacement cost present worth of \$4,115,836 and estimated O&M costs of \$185,716. The total present worth of the preferred alternate is \$60,696,838. Table 5.2.91 details the total present worth of all feasible alternatives.

Alternate	Capital Costs	Replacement Costs Present Worth	O&M Costs Present Worth			Total Present Worth
			Annual	Intermittent	Total	
Backshore Gravity / Lift Stations (Preferred)	\$56,395,285	\$797,931	\$144,969	\$40,747	\$185,716	\$57,378,932
Backshore Pump Stations	\$61,694,469	\$1,170,299	\$115,889	\$59,763	\$175,652	\$63,040,420
Backshore Low Pressure Sewer System	\$56,653,509	\$12,755,837	\$1,694,068	\$24,816	\$1,718,884	\$71,128,231
Land-Based Low Pressure Sewer System	\$70,024,641	\$9,056,716	\$871,786	\$12,408	\$884,194	\$79,965,551

5.5.2 Wastewater Treatment Plant (Plant) Alternatives

The estimated capital cost for the Integrated Fixed-Film Activated Sludge Alternate (Preferred) is \$5,620,585 with a replacement cost present worth of \$945,807 and estimated O&M costs of \$4,417,062. The total present worth of the preferred alternate is \$10,983,454. Table 5.2.92 details the total present worth of all feasible alternatives.

Alternative	Capital Costs	Replacement Costs Present Worth	O&M Costs Present Worth			Total Present Worth
			Annual	Intermittent	Total	
Sequencing Batch Reactor	\$8,713,257	\$778,227	\$5,105,839	\$24,816	\$5,130,655	\$14,622,139
Moving Bed Biofilm Reactor	\$5,914,697	\$945,488	\$4,410,413	\$6,204	\$4,416,617	\$11,276,802
Integrated Fixed-Film Activated Sludge (Preferred)	\$5,620,585	\$945,807	\$4,410,858	\$6,204	\$4,417,062	\$10,983,454

5.5.3 Subaqueous Sanitary Sewer (SASS) and Wastewater Treatment Plant (Plant) Alternatives

This section presents the costs associated with the combined SASS and Plant preferred alternates. Presented below are the costs associated with the entire needed project along with the costs associated with the portion of the project that will be completed as Phase 1. Phase 1 is the portion of the project that can be completed with the available SRF Funds. Table 5.2.93 details the total present worth of these feasible alternatives.

Table 5.2.93 Total Present Worth for Feasible Alternatives Lake Lure Subaqueous Sanitary Sewer Replacement Town of Lake Lure						
Alternative	Capital Costs	Replacement Costs Present Worth	O&M Costs Present Worth			Total Present Worth
			Annual	Intermittent	Total	
Collection System and Treatment Rehabilitation and Replacement	\$62,480,757	\$1,743,738	\$4,467,152	\$6,204	\$4,473,356	\$68,697,852
Collection System and Treatment Rehabilitation and Replacement Phase 1	\$12,500,000	\$522,915	\$4,491,676	\$46,951	\$4,538,627	\$17,561,543

Section 6.0 Proposed Project Description

The proposed project is the construction of a new sanitary collection system, a wastewater treatment plant rehabilitation, and sewer access valve installed in the dam. The project is located in the Mountains Region of North Carolina, in the Town of Lake Lure in Rutherford County. Figures 1.1 and 1.2 show the location of the project.

The ultimate goal is long-term regulatory compliance. Due to the magnitude of the issues, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. The short-term solution is the current SOC application. During the time period of the SOC, the Town of Lake Lure is intending to execute mid-term and long-term improvements. The mid-term improvements involve the rehabilitation of the existing manholes and improvements to the Wastewater Treatment Plant (Plant). The long-term improvements are related to a partial replacement of the Subaqueous Sewer System (SASS). The mid-term improvements are intended to improve the operations of the Plant and to reduce the lake infiltration of the SASS. Based on historic flow levels during various in lake elevation, it is readily apparent that significant amount of lake infiltration occurs in the upper 12-feet of lake elevation. To provide additional construction area, dewatering of the construction area, and a penetration of the dam, a sewer access valve will be installed at the base of the dam to allow the lake to be lowered an additional 8-feet in addition to the current 12-feet that can be achieved through the tainter gates.

No new areas are being provided with sewer service by this project. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect

to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

6.1 Backshore Gravity / Lift Station Project

The Backshore Gravity / Lift Station Alternative (Preferred) collects all existing flows via a network of gravity-flowing sewers that essentially parallel the lake shore line. These sewers include HDPE manholes and HDPE pipe, all designed for 100% long-term elimination of infiltration. Sewer manholes will be spaced less than 1,000 linear feet of main apart from each other to allow for jet cleaning and televising as may be warranted from time to time. Sewer mains between manholes will be laid at minimum slopes but unlike conventional sewers, the mains will follow the approximate curvature of the shoreline, using HDPE pipe bending radiuses down to the minimum recommended by the pipe's manufacturer.

Service laterals will be installed from the main (via an HDPE fusion process to preclude infiltration) to every other adjacent property line, from which the parcels on either side will be served.

Phase 1 (the portion that can be addressed with the available SRF funds) begins at the lake's dam and runs along the north and south shorelines for approximately 7,750 linear feet in each direction. This first Phase will eliminate reliance on the existing system for all properties immediately adjacent to the Phase 1 construction.

6.2 Integrated Fixed-Film Activated Sludge (IFAS) Project

The total implementation of this wastewater treatment plant alternative assumes the Subaqueous Sewer System (SASS) has been replaced as the SASS replacement will greatly reduce the risk of a continuous and uncontrolled flow rate for an indeterminate time period that would result from a failure in the SASS and would result in process failure of this wastewater treatment plant alternative. As a result, the current plan is to replace the SASS prior to completing the entire wastewater treatment plant rehabilitation. Select elements of the alternatives are planned as part of Phase 1, as a means of improving the operation of the wastewater plant while the SASS is replaced.

The IFAS Alternative (Preferred) involves modifications to some of the existing wastewater plant structures and equipment. The Phase 1 project specifically deals with improving solids handling of the existing physical/chemical process that would be maintained during the SASS replacement. The existing fine screen is improperly installed and allows solids to bypass the screen. The existing screen will be corrected. The high amount of grit from sand, silt, and corrosion by product will be removed by the addition of a grit removal system. The existing 95,000 gallon digester will be replaced with a new one of the same size. The capacity of the existing 0.995 MGD plant will not be increased and will remain a 0.995 MDG plant.

6.3 Collection System and Treatment Rehabilitation and Replacement Phase 1

A combination of the Gravity / Lift Station Alternative and IFAS Alternative is the preferred alternate for Phase 1 of this proposed project. Phase 1 (the portion that can be addressed with the available SRF funds) begins at the lake's dam and runs along the north and south shorelines for approximately 15,450 in total linear feet. This first Phase will eliminate reliance on the existing system for all properties immediately adjacent to the Phase 1 construction. Phase 1 of the project also includes work at the Plant to correct of the fine screen, install a grit removal system, and the replace the existing digester with a new one of the same size. The Phase 1 project specifically deals with improving solids handling of the existing physical/chemical process that would be maintained during the SASS replacement.

Phase 1 will consist of four (4) parts that will be bid as four (4) separate projects. These separate projects are: installation of the sewer access valve, manhole rehabilitation, wastewater treatment plant (Plant) rehabilitation, and SASS replacement. The sewer access valve will provide access to the construction area and access to the proposed SASS replacement alternative once it is installed. The manhole rehabilitation will eliminate the observed high level lake infiltration and prevent further deterioration of the manholes while the future SASS replacement phases are funding and executed. Rehabilitation at the Plant will address the immediate solids handling needs and chemical performance issues. The SASS replacement begins the process of upgrading existing SASS to address the primary issues of lake infiltration and remaining service life.

Phase 1 will address part of the infiltration issue through manhole rehabilitation and the beginning stages of SASS replacement. At the WWTP, Phase 1 will address issues dealing primarily with lake infiltration, but also with an inadequate solids handling process due to structural deficiencies in the existing digester and high levels of influent TSS that results from pipe degradation and silt and sediment entering the system. Phase 1 will replace the deficient digester and install a grit removal system to remove the sand and silt prior to entering the sedimentation basin. Rehabilitation of the headworks, submersible pump station, and the chlorine contact basin will also occur. The flow reduction from the manhole rehabilitation and Phase 1 of the SASS replacement will assist with hydraulic retention times and maintaining the NPDES permitted flow during the SASS replacement. Phase 1 will also allow for sludge handling to occur in the new digester. The new digester will be able to mix, aerate, and decant in order to thicken the sludge. The thickened sludge can then be hauled wet to a disposal site or a mobile belt press can be used to dewater the sludge such that the remaining cake can be disposed of. The option of wet or dry disposal will be at the discretion of the ORC and based on factors such as need, cost, and disposal options. The capacity of the existing 0.995 MGD plant will not be increased and will remain a 0.995 MDG plant.

The available funds are not sufficient to replace the entire SASS and fully rehabilitate the WWTP, as such Phase 1 will only partially solve the SASS and WWTP issues. However, it will establish the method for both and serve as a model for future phases.

6.4 Environmental Impacts

Secondary and cumulative impacts of the project will overall be positive and include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake. This project is mitigation for those anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will improve the integrity of existing streams and lakes in the project area, and substantially reduce the potential for breakages and associated SSOs.

The Backshore Gravity/Lift Station Alternative chosen to replace the existing SASS would be constructed within the confines of the lake by lowering the water level using the existing tainter gates and the sewer access valve. As such, land disturbance outside of the lake

would be minimal. Long-term, this alternative is judged to have the greatest potential for reducing environmental risks associated with sewerage the properties adjacent to the lakeshore. This alternative serves these properties by gravity, eliminating the risks of failure of the hundreds of pump stations that would otherwise be required downslope of each home towards the lakeshore and eliminates the existing aged subaqueous manholes and sewers that currently carry significant failure risk. The Backshore Gravity/Lift Stations Alternative has the further benefit of conveying those sewage flows largely by means of gravity, and minimizing the number of potential failure points.

In order to construct the replacement SASS, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the sewer installation. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet.

The installation of the Sewer Access Valve (SAV) will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

The environmental impact of the Integrated Fixed-Film Activated Sludge Alternative, will be limited to the existing wastewater plant site and the adjacent access road. The impacts would primarily be the risk from runoff during rain events that is typical with structure demolition and construction. The work to be completed at the Wastewater Treatment Plant (Plant) will be done within the existing Plant footprint.

FEMA floodplains and floodways will not be impacted by construction of this project.

Topographic, Soil, Prime and Unique Farmland, and Forest Resources impacts will occur during construction, but will be localized within small easements for lateral stub-outs and limited to construction only. The finished sewer line will be buried below tith depth. Pre-

construction contours will be restored. Disturbed areas will be promptly reseeded and vegetatively stabilized, if location allow. No burning of removed forest resources will occur. Erosion and sedimentation controls will be installed prior to the beginning of construction and include sediment fencing.

As the construction will occur along the backshore area of Lake Lure, there will be no disturbance of wetlands and no crossings of creeks/stream/rivers. The work at the Plant will not disturb any wetlands or creeks/stream/rivers. Water quality impacts will be minimal.

Temporary disturbance to aquatic habitats could affect the behavior of or directly harm some aquatic species with less mobility. The re-establishment of natural stream bed elevations would allow recovery of habitat and species in the streams. The movement of construction equipment could involve clearing of vegetation, which could temporarily disturb wildlife behavior. These disturbed access areas would likely be narrow enough not to present a break in habitat and therefore is not expected to change wildlife movement.

6.5 Project Costs

The estimated capital cost for the proposed project is \$12,500,000, with an estimated O&M cost of \$4,538,627. The total present worth of the project is estimated to be \$17,561,543.

Section 7.0 Environmental Information Document

7.1 Topography and Floodplains

This project is located in Lake Lure, NC, in the mountain physiographic province. The elevations in the area range from 880 feet (MSL) to 1,150 feet (MSL). In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

The project area is within the Inner Piedmont, Chauga, Smith River Allochthon, and Sauratown Mountain Belts, metamorphic formations described as massive to foliated, granodioritic, and migmatitic rock (NC Geological Survey, 1985).

Figure 7.1 show the project location on the Lake Lure, N.C. USGS Topographic Quadrangle Map. As stated above, the installation of the new sewer lines, manholes, and lateral stub-outs will occur along the backshore area of Lake Lure. The lake will be lowered approximately 20-feet prior to construction so that the new sewer lines, manholes, and lateral stub-outs can be installed. Once construction is complete, the water level will be returned to pre-construction levels. Direct impacts to topography will be temporary and occur during construction. Installation of new sewer lines (including manholes and lateral stub-outs) via open-cut methods will involve minor temporary disruption of the topography. Following construction, all areas disturbed by the installation of the new sewer lines will be restored to their pre-construction conditions/contours and any area disturbed will be promptly stabilized and re-seed with native vegetation, if the location of the disturbance allows. The new sewer lines proposed to be installed across Lake Lure, will be completed by trenchless methods via horizontal directional drills. There will be no permanent changes to the existing topography as a result of the construction of the proposed sewer lines.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. It is the construction of lateral sub-outs that may have a minor impact to topography with the lateral stub-outs impacting an area of approximately 5' x 5' each

Figure 7.2a through 7.2e illustrates the project area shown on Federal Emergency Management Agency (FEMA) Flood Rate Insurance Map (FIRM) Panels 0632, 0642, 0652, 0643, and 0653. Once again, the installation of the new sewer lines, manholes, and lateral stub-outs will occur along the backshore area of Lake Lure. The lake will be lowered approximately 20-feet prior to construction so that the new sewer lines, manholes, and lateral stub-outs can be installed. Once construction is complete, the water level will be returned to pre-construction levels. Impacts to 100-year floodplain and floodway will be temporary and occur during construction. Installation of new sewer lines (including manholes and lateral stub-outs) via open-cut methods will involve minor temporary disruptions of the floodplain and floodway. Following construction, all areas disturbed by the installation of the new sewer lines will be restored to their pre-construction conditions/contours and areas will be promptly stabilized and re-seed with native vegetation, if the location of the disturbance allows. The new sewer lines proposed to be installed across Lake Lure, will be completed by trenchless methods via horizontal directional drills. There will be no permanent changes to the existing floodplain and floodway as a result of the construction of the proposed sewer lines.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

There will be no operational impacts associated with the use of the SASS. There will be minimal operational impacts associated with the use of the Sewer Access Valve (SAV). While the SAV will allow for the lowering of the lake level more than is currently available, this additional lowering is not anticipated to have any greater environmental effect than

the previous lake level reductions. The lake currently is lowered at 1-foot per day, per the requirement found in the Town of Lake Lure's NPDES Permit, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. The SAV will also allow for the controlled rise of the lake level. The flow rate used to raise the lake level will not change following the installation of the SAV. Once again, this flow rate is dictated by the Town of Lake Lure's NPDES permit.

The project area contains Federal Emergency Management Agency (FEMA) Zone AE and Zone X designated 100-year floodplains and floodway areas around Lake Lure as shown on the above referenced Flood Insurance Rate Map (FIRM) Panels. Zone AE is defined as "areas subject to inundation by the 1-percent-annual-chance flood (100-year flood) event determined by detailed methods". Floodway areas in Zone AE are defined "as the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that 1% annual chance flood can be carried out without substantial increases in flood heights" (NCFMP 2010). Zone X is defined as "areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood" (500-year flood).

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Floodplains provide flood attenuation, enhance water quality by filtering nutrients and sediments, and provide valuable wildlife habitat by serving as breeding and feeding grounds. Development within the floodplain can reduce its water storage and overall function having adverse impacts on water quality and wildlife habitat. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project it to provide

sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. No increase in WWTP capacity or new or expanded discharges are proposed. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will improve the integrity of existing streams and lakes in the project area, and substantially reduce the potential for breakages and associated SSOs.

The Town of Lake Lure participates in the National Flood Insurance Program, and pursuant to Section 95.022 of the Town's Code of Ordinances, requires a Floodplain Development Permit for activities that will impact the Special Flood Hazard Area.

Project Engineers will secure and adhere to the conditions of the North Carolina Department of Environmental Quality (NCDEQ) Division of Energy, Mineral, and Land Resources (NCDEMLR) erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area. The devices will be designed to meet the 25 year storm. All disturbed areas will be promptly seeded and vegetatively stabilized, if location of disturbance allows. New development within the floodplain would be restricted and regulated through the Rutherford County Flood Damage Prevention Ordinance and the Town of Lake Lure Flood Damage Prevention Ordinance

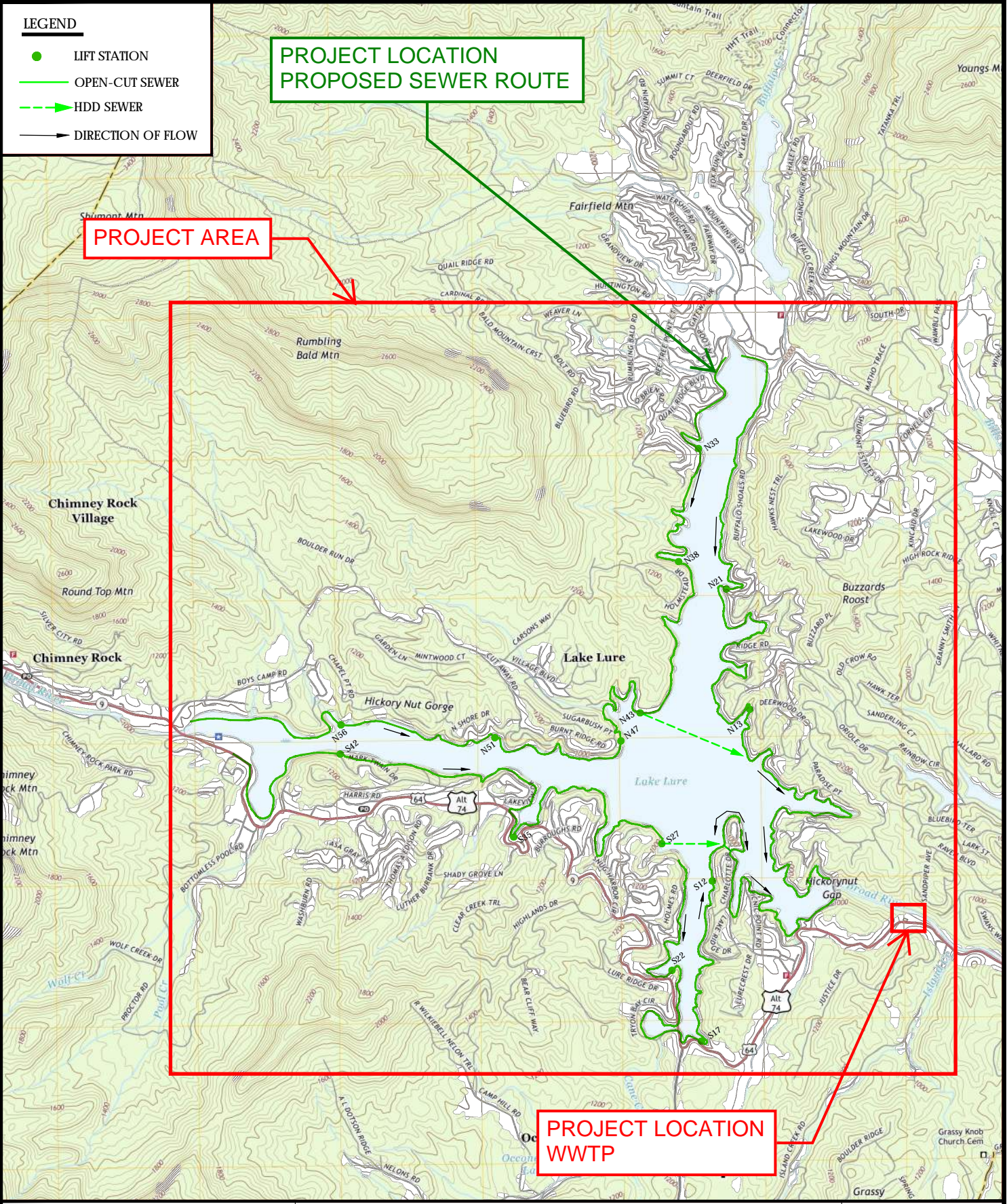
LEGEND

- LIFT STATION
- OPEN-CUT SEWER
- - - HDD SEWER
- DIRECTION OF FLOW

**PROJECT LOCATION
PROPOSED SEWER ROUTE**

PROJECT AREA

**PROJECT LOCATION
WWTP**



**PROJECT TOPOGRAPHY MAP
SUBAQUEOUS SANITARY SEWER REPLACEMENT**

LAKE LURE, NC

Project No. 2200559

FIGURE 7.1

August 2020



**PROJECT LOCATION
PROPOSED SEWER ROUTE**

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHA) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood) also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Areas are defined as follows:

- Zone AE** Special Flood Hazard Areas (SFHA) subject to inundation by the 1% annual chance flood.
- Zone AH** Areas of shallow water (1 to 3 feet) usually areas of ponding; Base Flood Elevations determined.
- Zone AO** Flood depths of 1 to 3 feet (usually areas of slow moving streams); average depths determined. For areas of actual fan flooding, velocities also determined.
- Zone AR** Special Flood Hazard Areas (SFHA) subject to inundation by the 1% annual chance flood by a flood control system that was substantially destroyed. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance or greater flood.
- Zone VE** Areas to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- Zone V** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- Zone X** Areas of 0.2% annual chance flood, areas of 1% annual chance flood with average depth of less than 1 foot or with changes in area less than 1.5-acre mile, and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- Zone B** Areas determined to be outside the 0.2% annual chance floodplain.
- Zone D** Areas in which flood hazard is an underestimate, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone AE boundary
- Zone O boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Zones and boundary dividing Special Flood Hazard areas of different Base Flood Elevations, flood depths or flood velocities
- Base Flood Elevation line and value, elevation in feet
- Base Flood Elevation value where uniform within zone, elevation in feet

Referenced to the North American Vertical Datum of 1988

- City
- County
- State
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 100-meter Universal Transverse Mercator grid lines, zone 17
- 200-foot grid values, North Carolina State Plane coordinate system (NAD 83)
- North Carolina Geographic Survey bench marks (for more information visit <http://www.ncgs.gov>)
- NAD 83 GPS 2-d Vertical Control Marks or Continuously-Operated NGS® Bench Marks (for more information visit <http://www.ngs.noaa.gov>)
- River Mile

GRID NORTH

MAP SCALE 1" = 500' (1" = 0.8333 MILES)

250 500 1000 FEET

150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0643J

FIRM FLOOD INSURANCE RATE MAP NORTH CAROLINA

PANEL 0643J
(SEE LOCATOR CHART/INDEX MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	COLL. PANEL	SURVEY
UNION COUNTY	0643J	0643J

EFFECTIVE DATE
JULY 2, 2008

MAP NUMBER
3710064300J

North Carolina State Seal
Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily clearly identify areas subject to flooding, particularly from local drainage sources of small size. The extremely steep topography shown here is not intended to provide specific or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles, Floodway Data, Limited Detailed Flood Hazard Data, and/or Summary of Billboard Elevations Tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accuracy of flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of **regulatory floodways** shown on the FIRM for flooding sources studied by detailed methods were computed at cross sections and measured between cross sections. The floodways were based on hydraulic computations with regard to measurements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data for flooding sources studied by detailed methods as well as non-encroachment widths for flooding sources studied by limited detailed methods are provided in the FIS report for this jurisdiction. The FIS report also provides instructions for determining a floodway using non-encroachment widths for flooding sources studied by limited detailed methods.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 4.4 "Flood Protection Measures" of the Flood Insurance Study report for information on the flood control structures in this jurisdiction.

Base map information and geographic data used to develop this FIRM were obtained from various organizations, including the participating local communities, state and federal agencies and/or other sources. The primary base for the FIRM is aerial imagery acquired by the State. The time period of collection for the State imagery is 2005 and 2006. Information and geographic data supplied by the local community(ies) that use FEMA base map specifications were considered the preferred source for development of the base map. See geographic metadata for the associated digital FIRM for additional information about base map preparation.

Base map features shown on this map, such as **corporate limits**, are based on the most up-to-date available at the time of publication. Changes to the corporate limits that have occurred since this map was published. Map users should consult the appropriate community official or website to verify current conditions of jurisdictional boundaries and base map features. This map may contain details that were not considered in the hydraulic analysis of flooding where a new hydraulic model was created during the production of this statewide format FIRM.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodways and floodways that were transferred from the previous FIRM were based on the stream channel configurations that were shown on the previous configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report which contain authoritative hydraulic data may reflect stream channel changes that differ from what is shown on this map.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels, community map repository addresses, and a listing of communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

If you have **questions about this map**, or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA-5347** (1-877-366-3637) or visit the FEMA website at <http://www.fema.gov>.

An accompanying **Flood Insurance Study report** (Letter of Map Revision (LOMR) or Letter of Map Amendment (LOMA) having portions of this panel) and digital versions of this FIRM may be available. Visit the North Carolina Floodplain Mapping Program website at <http://www.ncfloodmaps.com>, or contact the **FEMA Map Service Center** at 1-800-359-9671 for information on all related products associated with this FIRM. The FEMA Map Service Center may also be reached by Fax at 1-800-359-9600 and by website at <http://www.fema.gov>.

MAP REPOSITORY

(Refer to listing of Map Repository on Map Index at <http://www.fema.gov>)

EFFECTIVE DATE OF FLOOD INSURANCE RATE MAP PANEL
JULY 2, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For information on the National Flood Insurance Program or additional information, contact your insurance agent, the North Carolina Division of Emergency Management or the National Flood Insurance Program at the following phone numbers or website:

NC Division of Emergency Management 1-800-638-6622
National Flood Insurance Program (NFIP) 1-800-359-9671

7.2 Soils

The Natural Resources Conservation Service (NRCS) Soil Survey taken of the project area indicates 10 different soil map units. Figure 7.3 shows the soils found along the perimeter of the Lake Lure. Soils along the project corridor, along the perimeter of Lake Lure, include:

- Evard-Cowee Complex (EvD, EvE, EwF) (fine-loamy, parasesquic, mesic Typic Hapludults) consists of moderately deep, well drained, moderately rapid permeable soils on mountain slopes, hillslopes, and ridges. They form in residuum that is affected by soil creep in the upper solum from felsic to mafic, igneous, and high-grade metamorphic rocks such as mica gneiss, hornblende gneiss, and amphibolite. Slopes range from 15 to 30 percent (EvD), 30 to 50 percent (EvE), and 50 to 85 percent (EwF) and are stony (EvD, EvE) or rocky (EwF).
- Greenlee soils (GaC) (Greenlee-Tate Complex) (Loamy-skeletal, mixed, semiactive, mesic Typic Dystrudepts) consists of very deep, well drained, moderately rapidly permeable soils on benches, fans, and footslopes. The soils formed in colluvium and alluvium derived from materials weathered from felsic to mafic, high-grade metamorphic and igneous rocks such as granite, granite gneiss, mica gneiss, hornblende gneiss, and schist. Slopes are commonly 6 to 15 percent and are extremely bouldery.
- Pacolet soils (PaD2) (fine, kaolinitic, thermic Typic Kanhapludults) are very deep, well drained, moderately permeable soils that form in residuum weathered mostly from felsic igneous and metamorphic rocks of the Piedmont uplands. Slopes commonly are 15 to 25 percent but may range from 2 to 60 percent and are moderately eroded.
- Rion soils (RaE) (fine-loamy, mixed, semiactive, thermic Typic Hapludults) consists of very deep, very well drained, moderately permeable soils that formed in mostly weathered saprolite derived from granite and gneiss, acid crystalline rock. Slopes commonly are 25 to 45 percent.
- Rion-Ashlar Rock Outcrop Complex (RaF) consists of Rion soils and Ashlar soils (coarse-loamy, mixed, semiactive, thermic Typic Dystrudepts) which consists of a moderately deep, excessively drained, moderately rapid permeable soils that formed in residuum from felsic igneous or high-grade metamorphic rock. Slopes commonly are 45 to 70 percent.

- Tate soils (TbC) (Tate-Greenlee Complex) (fine-loamy, mixed, semiactive, mesic Typic Hapludults) are deep, well drained, moderately permeable soils on benches, fans, and toe slopes. They form in colluvium weathered from igneous and felsic to mafic high-grade metamorphic rocks. Slopes are generally between 6 to 15 percent and are very stony.
- Udorthents Soils (UdC, UoA) (loamy) consists of well drained, moderate to slow permeable soils of loamy and clayey human-transported material, mine spoil, or earthy fill derived from igneous, metamorphic and sedimentary rock. Slopes commonly are 0 to 15 percent (UdC) and 0 to 3 percent (UoA).

The soils described above are located along the perimeter of Lake Lure. In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'.

This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and soils that were disturbed during construction will be underwater.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. It is the construction of lateral sub-outs that may have a minor direct impact to soils with the lateral stub-outs impacting an area of approximately 5' x 5' each.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment

laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

No soil contamination is expected. No soil will be moved offsite. Proper erosion and sediment control measures will be installed and maintained to keep erosion from occurring outside of the project area until vegetation has been established within the construction corridor, if the location of the disturbance allows. Soil removed during trench excavation will be used to backfill after installation and pre-construction conditions will be restored.

It is anticipated there will be no operational impacts to any soils in the area.

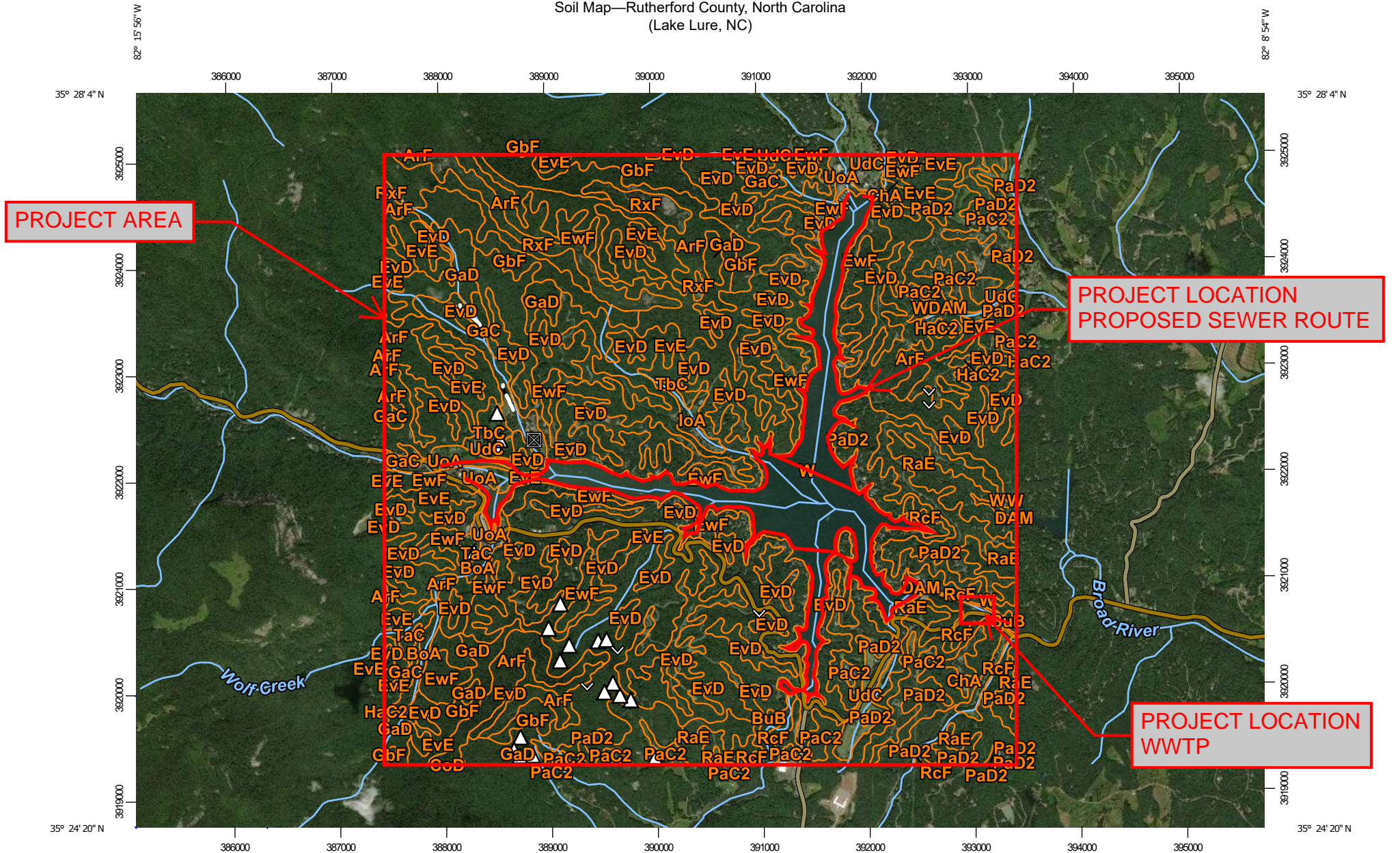
Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Land development can result in soil erosion and compaction from heavy equipment. Sedimentation in adjacent water may decrease water quality and degrade aquatic habitat. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will improve the integrity of existing streams and lakes in the project area, and substantially reduce the potential for breakages and associated SSOs.

Project Engineers will secure and adhere to the conditions of the North Carolina Department of Environmental Quality (NCDEQ) Division of Energy, Mineral, and Land Resources (NCDEMLR) erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area. The devices will be designed to meet the 25 year storm. All disturbed areas will be promptly seeded and vegetatively stabilized if location of disturbance allows. New development would be regulated through the Town of Lake Lure's Soil Erosion and Sedimentation Control Ordinance (Chapter 96), NC Sediment Pollution Control Act of 1973, and NPDES Stormwater Regulations.

Soil Map—Rutherford County, North Carolina
(Lake Lure, NC)



Map Scale: 1:48,700 if printed on A landscape (11" x 8.5") sheet.
0 500 1000 2000 3000 Meters
0 2000 4000 8000 12000 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

FIGURE 7.3
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rutherford County, North Carolina

Survey Area Data: Version 20, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 2, 2010—Nov 9, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ArF	Ashe-Cleveland-Rock outcrop complex, 50 to 95 percent slopes	531.7	6.2%
BoA	Bandana-Ostin complex, 0 to 3 percent slopes, occasionally flooded	39.1	0.5%
BuB	Buncombe loamy sand, 0 to 5 percent slopes, occasionally flooded	9.5	0.1%
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	31.5	0.4%
CoD	Clifffield-Cowee complex, 15 to 30 percent slopes, very stony	0.8	0.0%
DAM	Dam	2.6	0.0%
EvD	Evard-Cowee complex, escarpment, 15 to 30 percent slopes, stony	1,160.7	13.6%
EvE	Evard-Cowee complex, escarpment, 30 to 50 percent slopes, stony	2,759.0	32.4%
EwF	Evard-Cowee complex, 50 to 85 percent slopes, rocky	373.9	4.4%
GaC	Greenlee-Tate complex, 6 to 15 percent slopes, extremely bouldery	162.2	1.9%
GaD	Greenlee-Tate complex, escarpment, 15 to 30 percent slopes, extremely bouldery	184.6	2.2%
GbF	Greenlee-Tate complex, escarpment, 30 to 70 percent slopes, rubbly	352.9	4.1%
HaC2	Hayesville sandy clay loam, 8 to 15 percent slopes, moderately eroded	17.8	0.2%
HaD2	Hayesville sandy clay loam, 15 to 30 percent slopes, moderately eroded	11.9	0.1%
IoA	Ioila sandy loam, 0 to 2 percent slopes, occasionally flooded	28.8	0.3%
PaC2	Pacolet sandy clay loam, 8 to 15 percent slopes, moderately eroded	217.1	2.6%
PaD2	Pacolet sandy clay loam, 15 to 25 percent slopes, moderately eroded	775.0	9.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RaE	Rion sandy loam, 25 to 45 percent slopes	508.3	6.0%
RcF	Rion-Ashlar-Rock outcrop complex, 45 to 70 percent slopes	124.3	1.5%
RxF	Rock outcrop-Cleveland complex, 30 to 95 percent slopes	153.7	1.8%
TaC	Tate gravelly loam, 8 to 15 percent slopes	17.1	0.2%
TbC	Tate-Greenlee complex, escarpment, 6 to 15 percent slopes, very stony	63.1	0.7%
UdC	Udorthents, loamy, 0 to 15 percent slopes	109.2	1.3%
UoA	Udorthents, loamy, 0 to 3 percent slopes, rarely flooded	105.9	1.2%
W	Water	768.4	9.0%
Totals for Area of Interest		8,509.0	100.0%

7.3 Prime and Unique Farmland

The project area contains an approximate 2 mile stretch of prime and unique farmland along the southeast perimeter of Lake Lure. This land is currently zoned as either a residential, resort residential, or commercial general district and is not being used as agricultural land. Figure 7.4 shows the soils within the project area and provides a description of which of these soils are classified as prime and unique farmland.

In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. It is the construction of lateral sub-outs along the 2 miles of prime and unique farmland that may have a minor direct impact to these lands with the lateral stub-outs impacting an area of approximately 5' x 5' each.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

It is anticipated there will be no operational impacts to any prime and unique farmland in the area.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Future development is likely to affect agricultural production within the Service Area. The lateral stub-outs to be installed from the sanitary sewer main and potentially into prime and unique farmland will be buried below tith depth and no loss of the use of these soils will result. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

Temporary disturbances to prime and unique farmland would be protected by local, state, and federal ordinances such as the Farmland Protection Policy Act.

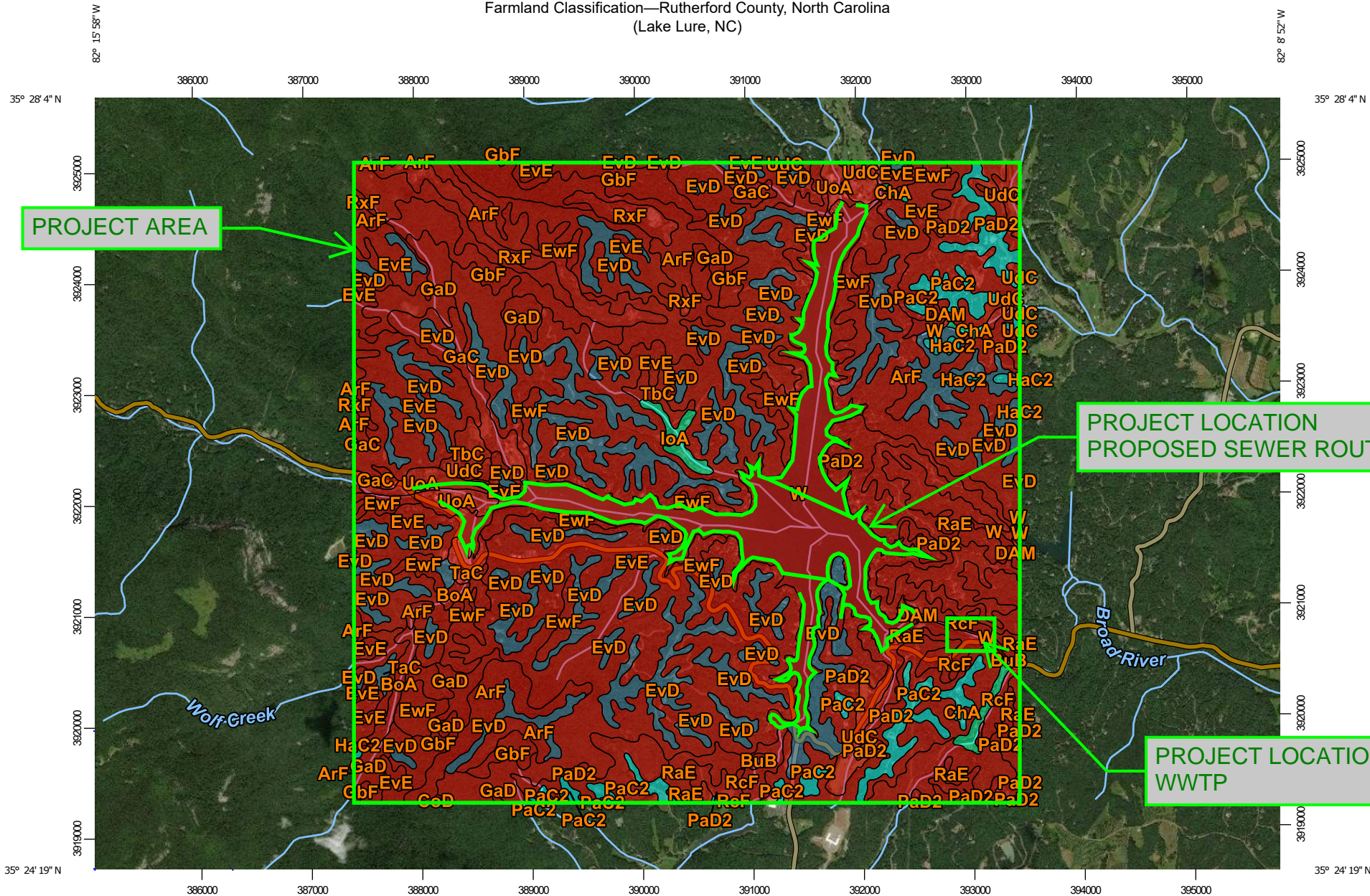
The Farmland Protection Policy Act discourages Federal activities that would convert farmland to nonagricultural purposes.

The Town of Lake Lure 2007-2027 Comprehensive Plan addresses the changing dynamics of the area and provides a vision of where the Town wants to be. While development in agricultural lands is expected to occur, through proper growth management and land use planning, development can maintain its course without jeopardizing the quality of the environment or the quality of life.

The Rutherford County Soil and Water Conservation District works to assist with agricultural conservation needs along with the NC Agricultural Cost Share Program, the Natural Resource Conservation Service, and the Farm Service Agency. These agencies encourages the preservation and protection of farmland from non-farm development.

The Rutherford County Planning and Development Ordinance assists in regional planning and economic development. This ordinance promotes agricultural values and general welfare of the county in an effort to protect agricultural lands from non-farm development and other negative impacts on property managed farms.

Farmland Classification—Rutherford County, North Carolina
(Lake Lure, NC)



PROJECT AREA

PROJECT LOCATION
PROPOSED SEWER ROUTE

PROJECT LOCATION
WWTP

Map Scale: 1:49,100 if printed on A landscape (11" x 8.5") sheet.

0 500 1000 2000 3000 Meters

0 2000 4000 8000 12000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

FIGURE 7.4

Farmland Classification—Rutherford County, North Carolina
(Lake Lure, NC)









MAP LEGEND








Area of Interest (AOI)






Area of Interest (AOI)








Soils



Soil Rating Polygons

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season









-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of statewide importance, if drained
-  Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated

-  Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated and drained
-  Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
-  Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60



































-  Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough
-  Farmland of statewide importance, if thawed
-  Farmland of local importance
-  Farmland of local importance, if irrigated

-  Farmland of unique importance
-  Not rated or not available















Soil Rating Lines

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Farmland Classification—Rutherford County, North Carolina
(Lake Lure, NC)

	Prime farmland if subsoiled, completely removing the root inhibiting soil layer		Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium		Farmland of unique importance		Prime farmland if subsoiled, completely removing the root inhibiting soil layer
	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60		Farmland of statewide importance, if irrigated and drained		Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season		Soil Rating Points Not prime farmland		Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
	Prime farmland if irrigated and reclaimed of excess salts and sodium		Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season		Prime farmland if drained		Prime farmland if irrigated and reclaimed of excess salts and sodium
	Farmland of statewide importance		Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer		Farmland of statewide importance, if warm enough		Prime farmland if protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance
	Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60		Farmland of statewide importance, if thawed		Prime farmland if irrigated		Farmland of statewide importance, if drained
	Farmland of statewide importance, if irrigated				Farmland of local importance		Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
					Farmland of local importance, if irrigated		Prime farmland if irrigated and drained		Farmland of statewide importance, if irrigated
							Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season		

Farmland Classification—Rutherford County, North Carolina
(Lake Lure, NC)

<ul style="list-style-type: none">  Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season  Farmland of statewide importance, if irrigated and drained  Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season  Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer  Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60 	<ul style="list-style-type: none">  Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium  Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season  Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season  Farmland of statewide importance, if warm enough  Farmland of statewide importance, if thawed  Farmland of local importance  Farmland of local importance, if irrigated 	<ul style="list-style-type: none">  Farmland of unique importance  Not rated or not available <p>Water Features</p> <ul style="list-style-type: none">  Streams and Canals <p>Transportation</p> <ul style="list-style-type: none">  Rails  Interstate Highways  US Routes  Major Roads  Local Roads <p>Background</p> <ul style="list-style-type: none">  Aerial Photography 	<p>The soil surveys that comprise your AOI were mapped at 1:24,000.</p> <p>Please rely on the bar scale on each map sheet for map measurements.</p> <p>Source of Map: Natural Resources Conservation Service Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)</p> <p>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.</p> <p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p> <p>Soil Survey Area: Rutherford County, North Carolina Survey Area Data: Version 21, Jun 3, 2020</p> <p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p> <p>Date(s) aerial images were photographed: Dec 2, 2010—Nov 9, 2017</p> <p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p>
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Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ArF	Ashe-Cleveland-Rock outcrop complex, 50 to 95 percent slopes	Not prime farmland	545.1	6.3%
BoA	Bandana-Ostin complex, 0 to 3 percent slopes, occasionally flooded	Not prime farmland	39.1	0.5%
BuB	Buncombe loamy sand, 0 to 5 percent slopes, occasionally flooded	Not prime farmland	10.0	0.1%
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	Prime farmland if drained	31.5	0.4%
CoD	Clifffield-Cowee complex, 15 to 30 percent slopes, very stony	Not prime farmland	1.9	0.0%
DAM	Dam	Not prime farmland	2.8	0.0%
EvD	Evard-Cowee complex, escarpment, 15 to 30 percent slopes, stony	Farmland of local importance	1,170.5	13.5%
EvE	Evard-Cowee complex, escarpment, 30 to 50 percent slopes, stony	Not prime farmland	2,789.1	32.2%
EwF	Evard-Cowee complex, 50 to 85 percent slopes, rocky	Not prime farmland	375.8	4.3%
GaC	Greenlee-Tate complex, 6 to 15 percent slopes, extremely bouldery	Not prime farmland	167.9	1.9%
GaD	Greenlee-Tate complex, escarpment, 15 to 30 percent slopes, extremely bouldery	Not prime farmland	188.8	2.2%
GbF	Greenlee-Tate complex, escarpment, 30 to 70 percent slopes, rubbly	Not prime farmland	362.4	4.2%
HaC2	Hayesville sandy clay loam, 8 to 15 percent slopes, moderately eroded	Farmland of statewide importance	18.6	0.2%
HaD2	Hayesville sandy clay loam, 15 to 30 percent slopes, moderately eroded	Not prime farmland	12.6	0.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
IoA	IoA sandy loam, 0 to 2 percent slopes, occasionally flooded	Prime farmland if drained	28.8	0.3%
PaC2	Pacolet sandy clay loam, 8 to 15 percent slopes, moderately eroded	Farmland of statewide importance	227.0	2.6%
PaD2	Pacolet sandy clay loam, 15 to 25 percent slopes, moderately eroded	Not prime farmland	801.6	9.3%
RaE	Rion sandy loam, 25 to 45 percent slopes	Not prime farmland	528.7	6.1%
RcF	Rion-Ashlar-Rock outcrop complex, 45 to 70 percent slopes	Not prime farmland	130.4	1.5%
RxF	Rock outcrop-Cleveland complex, 30 to 95 percent slopes	Not prime farmland	156.3	1.8%
TaC	Tate gravelly loam, 8 to 15 percent slopes	Farmland of local importance	17.1	0.2%
TbC	Tate-Greenlee complex, escarpment, 6 to 15 percent slopes, very stony	Not prime farmland	63.1	0.7%
UdC	Udorthents, loamy, 0 to 15 percent slopes	Not prime farmland	116.8	1.3%
UoA	Udorthents, loamy, 0 to 3 percent slopes, rarely flooded	Not prime farmland	106.3	1.2%
W	Water	Not prime farmland	768.8	8.9%
Totals for Area of Interest			8,660.7	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

7.4 Land Use

The current land use around the perimeter of Lake Lure includes of zoning designations consisting of R-1, R-1A, R-1B and R-1D (Residential), R-2 (General Residential), R-3 (Resort Residential), R-4 (Residential/Office), CG (Commercial General), GU (Governmental-Institutional), and L-1 (Lake). Figure 7.5 shows the zoning designations for not only those areas around the perimeter of Lake Lure but for the entire Town of Lake Lure.

In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater. The zoning designation for the backshore area of Lake Lure is L-1 or Lake District. This district is established as a district for recreational purposes.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. It is the construction of lateral sub-outs that may have a minor direct impact to land use with the lateral stub-outs impacting an area of approximately 5' x 5' each.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

It is anticipated there will be no operational impacts to any land use in the area.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Future development is likely to affect land use within the Service Area. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

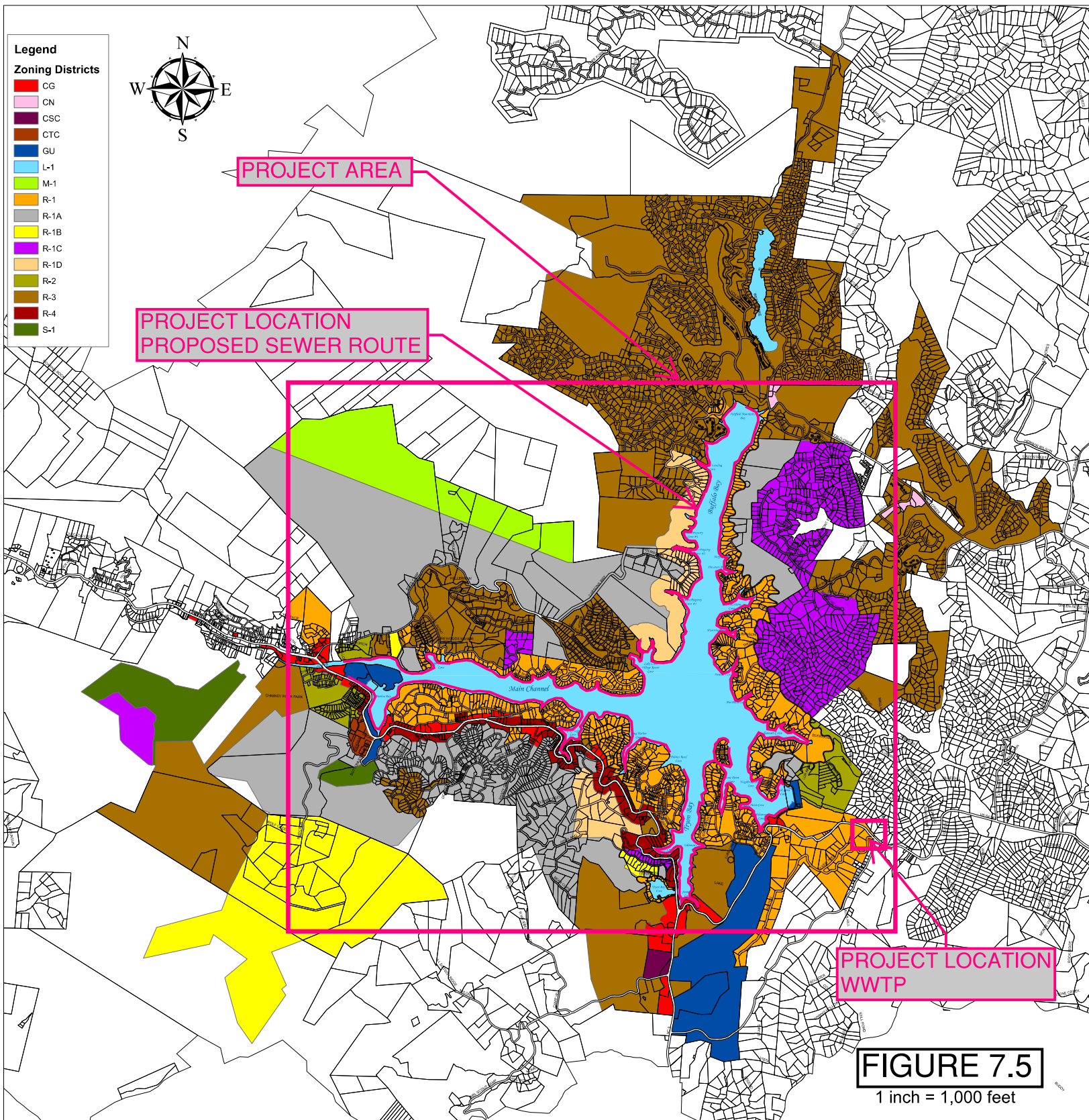
Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

New development may require land use designations to be re-evaluated through the Town of Lake Lure re-zoning process and compared to the vision laid out in the Town of Lake Lure 2007-2027 Comprehensive Plan. The Lake Lure Soil Erosion and Sedimentation Control Ordinance must be followed for any future development along with all other

applicable Land Use Regulations per the Rutherford County Planning and Development Ordinance.

Town of Lake Lure Official Zoning Map



7.5 Forest Resources

There are three (3) different types of forest resources with the project area: Mature Bottomland Hardwood Forests, Upland Hardwood Forests, and Pine Plantations.

Species common to Bottomland Hardwood Forests include red maple, sycamore, green ash, sweetgum, river birch, green ash, willow oak, and water oak. Upland Hardwood Forests contain several oak and hickory species, tulip poplar, sourwood, sweetgum, and red maple.

Within the outfall's service area, forest habitats, particularly upland hardwood forests, occur sporadically across the landscape. Fragmentation from development activities have impacted most area forests. Continuous forests do occur primarily along streams and rivers and adjacent floodplains where development and farming have been precluded.

Bottomland and upland hardwood forests found in the project area support a variety of wildlife, including amphibians (spotted and slimy salamanders, gray tree frogs, and American toad), reptiles (black rat, racer, ringneck and copperhead snakes, box turtle, and five-lined skinks), birds (robins, mockingbirds, bluebirds, woodcock, turkey, blue jays, warblers, and hawks), and mammals (gray squirrels, white-tailed deer, short-tailed shrews, grey fox, opossum, raccoon, and red bat). Typical animals found in these forests include copperhead and black rat snake, mockingbirds, turkey, hawks, and white-tailed deer.

In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. It is the construction of lateral sub-outs that may have a minor direct impact to forest resources with the lateral stub-outs impacting an area of approximately 5' x 5' each.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

It is anticipated there will be no operational impacts to any forest resources in the area.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Future development is likely to affect forest resources within the Service Area. Construction and land clearing for development would result in the loss of forested resources and degradation of wildlife habitat. Wildlife corridors can become fragmented and the abundance and diversity of species would decline. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's

property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

Land clearing activities would be limited to restrictions detailed out in the Town of Lake Lure Land Use Ordinances and compared to the vision laid out in the Town of Lake Lure 2007-2027 Comprehensive Plan. The Lake Lure Soil Erosion and Sedimentation Control Regulations must be followed for any future development along with all other applicable Land Use Regulations per the Rutherford County Planning and Development Ordinance.

7.6 Wetlands and Streams

The proposed project will be installed along the backshore area of Lake Lure. In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

US Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) dataset identified one (1) wetland area within the project area, on the west side of Lake Lure. The Cowardin Classification of the wetland found within the project area is PEM1Ah. Wetlands provide flood control, filter pollutants (sediment and nutrients) from upslope runoff, recharge ground water and can discharge groundwater into stream. Wetlands are essential to biological productivity by providing wildlife habitat and refuge for a variety of organisms including fish, amphibians, reptiles, water flow, insects, and mammals. Loss of wetland functions can have an adverse impact on wildlife and water quality.

US Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) dataset identifies one (1) lake, one (1) river, and five (5) streams within the project area. Lake Lure Classification "B" and "Tr") was created by the construction of two (2) dams across the Broad River. The Broad River (NCDEQ Classification of "C") runs west to east through Lake Lure. The streams in the area that discharge into either Lake Lure or the Broad River are: Buffalo Creek (Classification "C" and "Tr"), Cane Creek (Classification "C" and "Tr"), Island Creek (Classification "C"), Pool Creek (Classification "C" and "Tr"), and Rock Creek (Classification "C" and "Tr").

Direct wetland impacts will not result from construction activities associated with the installation of the proposed project as it will occur along the backshore area of Lake Lure. There will be no crossing of wetlands with the proposed project. Sediment and erosion

control measures will be installed and maintained throughout the entire duration of the project to ensure sediment runoff from construction activities do not have the ability to enter the known wetland. Due to the location of construction no temporary or permanent wetland impacts exist.

Direct stream impacts will not result from construction activities associated with the installation of the project as it will occur along the backshore area of Lake Lure. There will be no crossing of streams with the proposed project. Sediment and erosion control measures will be installed and maintained throughout the entire duration of the project to ensure sediment runoff from construction activities do not have the ability to enter the known streams. Due to the location of construction no temporary or permanent stream impacts exist.

Direct impacts to Lake Lure will result from construction activities associated with the installation of the project as it will occur along the backshore area of Lake Lure. Sediment and erosion control measures will be installed and maintained throughout the entire duration of the project to ensure sediment runoff from construction activities do not have the ability to enter Lake Lure. Following construction activities, the stream bed and banks will be re-graded and restored to pre-construction conditions and contours. Construction across and below Lake Lure will also occur with the installation of sanitary sewer force main via two (2) horizontal directional drills (HDD). This trenchless method of pipe installation will allow for no impacts to Lake Lure during construction.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area. This construction will not impact any wetlands or streams.

There will be no operational impacts associated with the use of the SASS. There will be minimal operational impacts associated with the use of the Sewer Access Valve (SAV). While the SAV will allow for the lowering of the lake level more than is currently available,

this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, per the requirement found in the Town of Lake Lure's NPDES Permit, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. The SAV will also allow for the controlled rise of the lake level. The flow rate used to raise the lake level will not change following the installation of the SAV. Once again, this flow rate is dictated by the Town of Lake Lure's NPDES permit.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Wetlands provide habitat for a wide range of plant and animal species as well as improve water quality by filtering pollutants. Additionally, wetlands play an essential role in providing water retention and regulating stream flows. Loss of wetlands and stream would have an adverse impact on water quality and wildlife habitat. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and

infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will improve the integrity of existing streams and lakes in the project area, and substantially reduce the potential for breakages and associated SSOs.

The project alignment was designed to avoid as much as possible and minimize impacts to wetlands, streams, and Lake Lure. Project Engineers will secure and adhere to the conditions of the NCDEMLR erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area. All disturbed areas will be promptly seeded and vegetatively stabilized, if location allows. The Rutherford County Stormwater Ordinance requirements and the Lake Lure Soil Erosion and Sedimentation Control Regulations must be followed for any future development along with Section 404401 of the Clean Water Act.

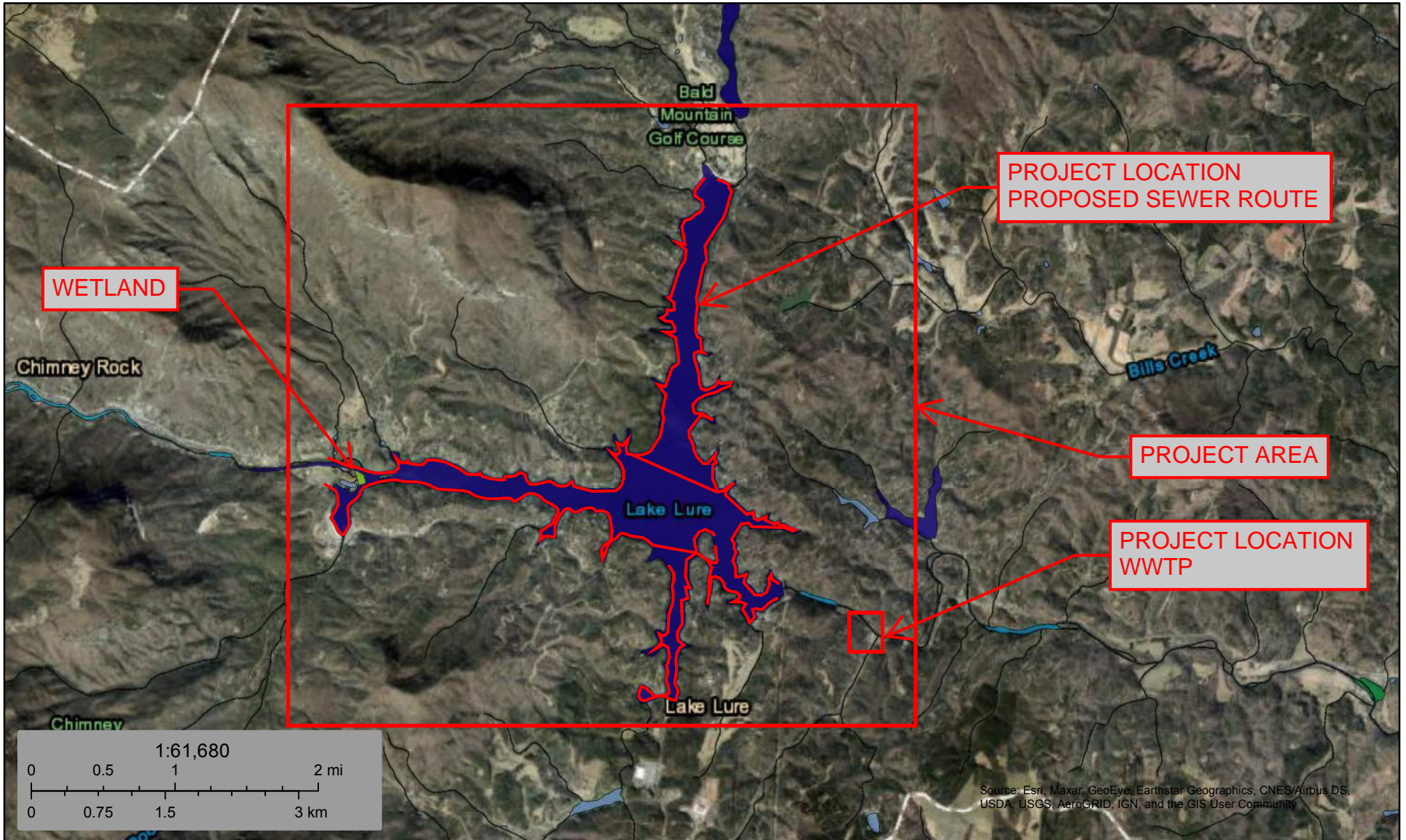
The Rutherford County Watershed Ordinance details out proper management of development in order to protect property, control stream channel erosion, prevent increased flooding associated with new development, protect floodplains, wetlands, water resources, riparian buffers, riparian and aquatic ecosystems, and the general watershed in its entirety.

The Rutherford County Flood Damage Prevention Regulations and the Town of Lake Lure Flood Damage Prevention Ordinance promotes public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas. The regulation/ordinance restricts and/or prohibits uses that are dangerous to health, safety, and property due to water or erosion hazards or that result in damaging increases in erosion, flood heights or velocities. They require that development vulnerable to floods be protected against flood damage at the time of initial construction and oversees control of the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters. The regulation/ordinance also controls filling, grading, dredging, and all other development that may increase erosion or flood damage. Finally, the regulation/ordinance prevents or regulates the construction of

flood barriers that will unnaturally divert flood waters or which may increase flood hazards to other lands.

The Rutherford County Soil and Water Conservation District works to assist with agricultural conservation needs along with the NC Agricultural Cost Share Program, the Natural Resource Conservation Service, and the Farm Service Agency. The NC Agricultural Cost Share Program addresses agriculture's contribution to non-point source pollution and the inclusion of best management practices to improve the efficiency of farming operations while reducing the potential for surface and ground water pollution.

Section 404/401 of the Clean Water Protection Act requires a permit be obtained by any development that may result in a discharge into a water of the United States.



August 7, 2020

Wetlands








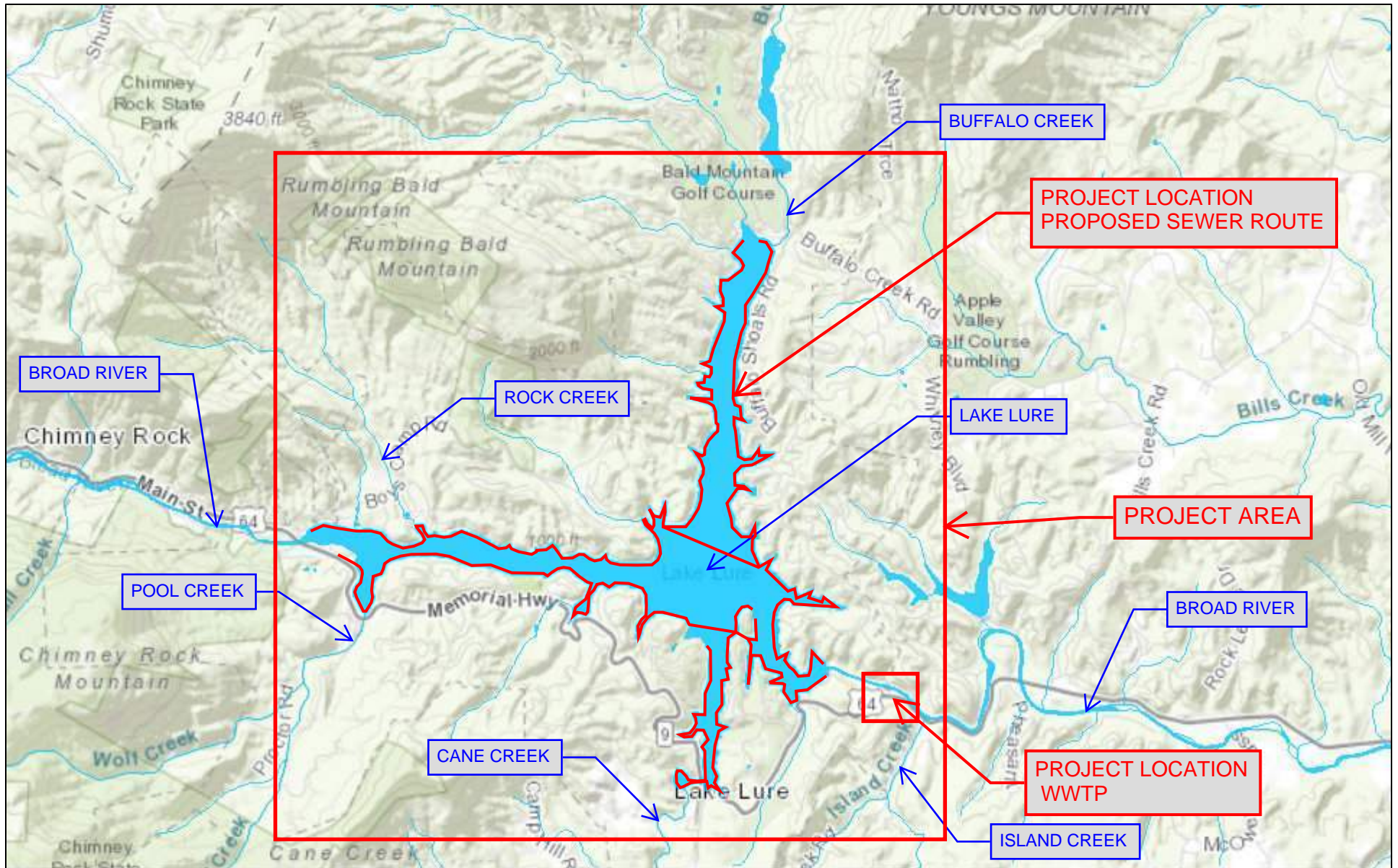
- | | | |
|--|---|--|
|  Estuarine and Marine Deepwater |  Freshwater Emergent Wetland |  Lake |
|  Estuarine and Marine Wetland |  Freshwater Forested/Shrub Wetland |  Other |
| |  Freshwater Pond |  Riverine |

FIGURE 7.6

Streams



- Rivers
- Lakes

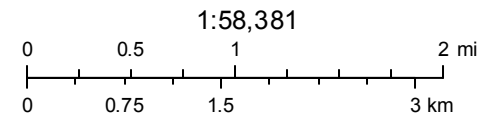


FIGURE 7.7

7.7 Water Resources

The project site and greater project area is located in the Broad River Basin, more specifically, the Upper Broad River Subbasin (HUC 03050105) and includes the Headwaters Broad River Watershed (HUC 0305010503).

The primary aquifer in the project area is the Piedmont and Blue Ridge crystalline rock aquifer (USGS 2009). Groundwater recharge is variable as it is determined by local precipitation and runoff. Recharge that enters the aquifer can be variable and influenced by topographic relief and the capacity of the land surface to accept water infiltration. The well yield ranges are from 15 gal/min to 30 gal/min depending on the size of the well. Groundwater movement is generally from high to low elevations reflecting existing topography. Perennial streams typically are groundwater discharge points.

Little is known about the groundwater quantity, quality, and depth in the proposed project area. Columbus groundwater monitor and research station is located approximately 20 miles south of the project area. Historically, depth to water level is approximately 23 feet below land surface. Groundwater sampling results indicated the wells are of good quality and free of contaminants.

The primary source of drinking water for the service area comes from multiple underground wells located around the Town of Lake Lure, including a very large well located in Chimney Rock Village.

Lake Lure (Classification “B” and “Tr”) and the Broad River (Classification “C”), to the west of Lake Lure, are not impaired. The Broad River (Classification “C”), to the east of Lake Lure, is impaired by Benthos and Fish Tissue Mercury as these parameters both exceed the allowable criteria.

Additional creeks that discharge into either Lake Lure or the Broad River (Classification “C”) are: Buffalo Creek (Classification “C” and “Tr”), Cane Creek (Classification “C” and “Tr”), Island Creek (Classification “C”), Pool Creek (Classification “C” and “Tr”), and Rock Creek (Classification “C” and “Tr”).

Class B waters are “waters protected for all Class C uses in addition to primary recreation. Primary recreational activities include swimming, skin diving, water skiing, and similar uses involving human body contact with water where such activities take place in an

organized manner or on a frequent basis”. The best usage of Class B waters shall be “primary contact recreation and any other best usage specified for Class C waters” (NCDEQ 15A NCAC 02B.0219).

Class C waters are “waters protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner”. The best usage of Class C waters shall be “aquatic life propagation, survival, and maintenance of biological integrity (including fishing and fish); wildlife; secondary contact recreation as defined in Rule .0202 of this Section; agriculture; and any other usage except for primary contact recreation or as a source of water supply for drinking, culinary, and food processing purposes” (NCDEQ 15A NCAC 02B.0211).

Class Tr waters are trout waters. This supplemental classification is “intended to protect freshwaters which have conditions which shall sustain and allow for trout propagation and survival of stocked trout on a year-round basis”.

In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction ‘in the dry’. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based

construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

Minimal direct impacts to water resources may occur from the grading construction activities proposed as part of the project. The requirements of the approved erosion and sedimentation control permit will be followed throughout the duration of the project.

No direct impacts to groundwater quality are anticipated to occur during construction.

There will be no operational impacts to surface water quality and groundwater quality/quantity associated with the use of the SASS. There will be minimal operational impacts associated to surface water quality and groundwater quality/quantity with the use of the Sewer Access Valve (SAV). While the SAV will allow for the lowering of the lake level more than is currently available, this additional lowering is not anticipated to have any greater environmental effect, to the lake or downstream of the lake, than the previous lake level reductions. The lake currently is lowered at 1-foot per day, per the requirement found in the Town of Lake Lure's NPDES Permit. The lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. The SAV will also allow for the controlled rise of the lake level. The flow rate used to raise the lake level will not change following the installation of the SAV. Once again, this flow rate is dictated by the Town of Lake Lure's NPDES permit.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. New development may introduce new impervious surfaces which, in turn, may increase surface water runoff. The velocity at which stormwater runoff may enter a stream may cause instability of the stream bank causing it to erode and impacting aquatic habitat. Untreated stormwater runoff could introduce pollutants and degrade water quality. New development could have adverse impacts on groundwater if contaminants reach groundwater sources. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The

capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary or cumulative impacts could be fewer people relying on groundwater as their source of drinking water as water and sanitary sewer services expand. This in turn would reduce the demand for groundwater as drinking water and lessening the risk of groundwater contamination from failing septic systems. Additional positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will improve the integrity of existing streams and lakes in the project area, and substantially reduce the potential for breakages and associated SSOs.

Project Engineers will secure and adhere to the conditions of a NCDEMLR erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area to limit the amount of sediment that enters streams. All disturbed areas will be promptly seeded and vegetatively stabilized, if location allows. The Lake Lure Soil Erosion and Sedimentation Control Regulations must be followed for any future development.

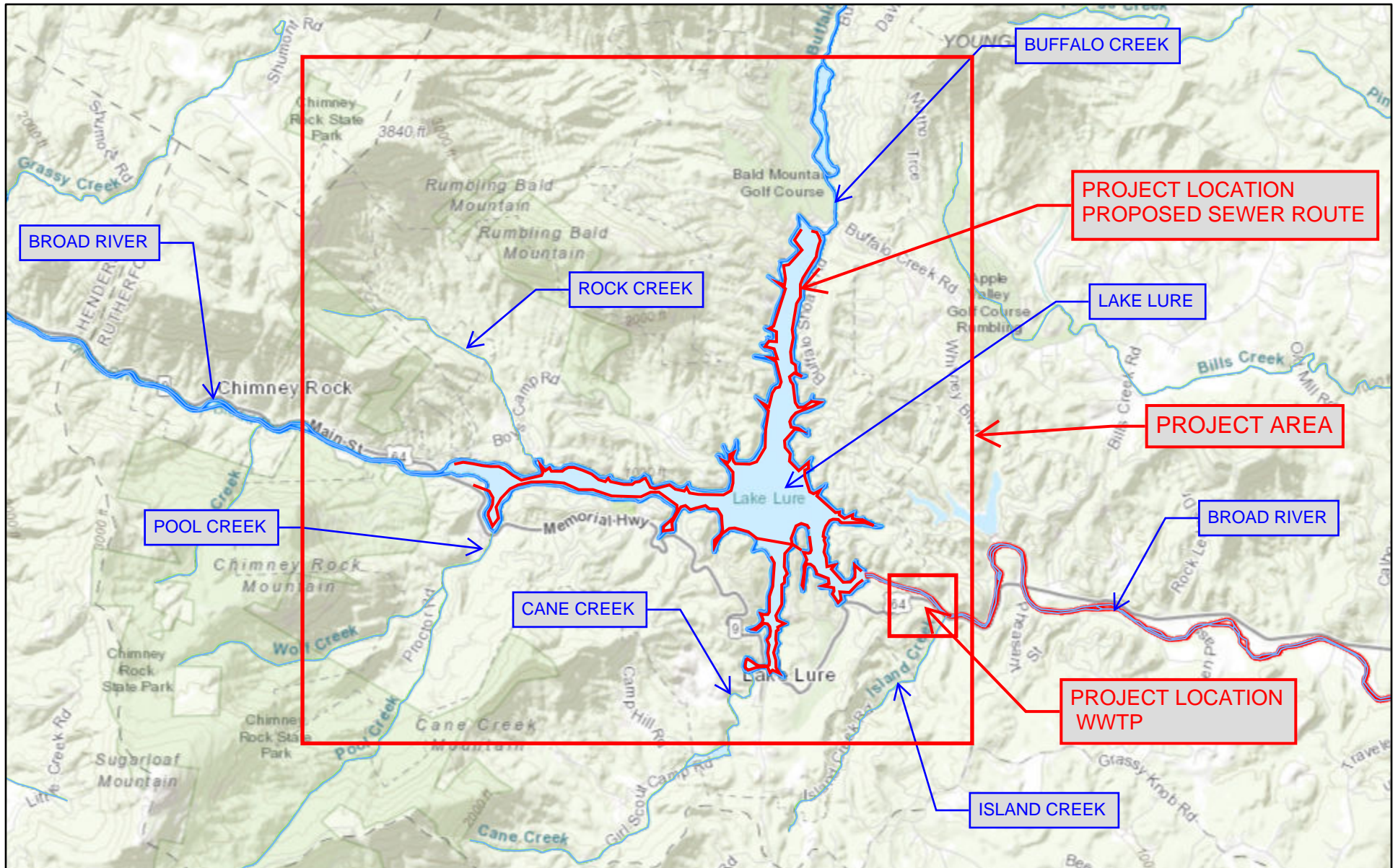
The Rutherford County Watershed Ordinance details out proper management of development in order to protect property, control stream channel erosion, prevent increased flooding associated with new development, protect floodplains, wetlands, water resources, riparian buffers, riparian and aquatic ecosystems, and the general watershed in its entirety.

The Rutherford County Flood Damage Prevention Regulations and the Town of Lake Lure Flood Damage Prevention Ordinance promotes public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas. The regulation/ordinance restricts and/or prohibits uses that are dangerous to health, safety, and property due to water or erosion hazards or that result in damaging increases in erosion, flood heights or velocities. They require that development vulnerable to floods be protected against flood damage at the time of initial construction and oversees control of the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters. The regulation/ordinance also controls filling, grading, dredging, and all other development that may increase erosion or flood damage. Finally, the regulation/ordinance prevents or regulates the construction of flood barriers that will unnaturally divert flood waters or which may increase flood hazards to other lands.

The Rutherford County Soil and Water Conservation District works to assist with agricultural conservation needs along with the NC Agricultural Cost Share Program, the Natural Resource Conservation Service, and the Farm Service Agency. The NC Agricultural Cost Share Program addresses agriculture's contribution to non-point source pollution and the inclusion of best management practices to improve the efficiency of farming operations while reducing the potential for surface and ground water pollution.

Section 404/401 of the Clean Water Protection Act requires a permit be obtained by any development that may result in a discharge into a water of the United States.

Impaired Streams



1:72,224

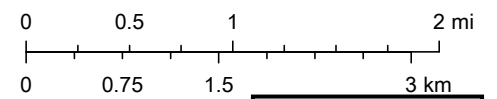


FIGURE 7.8

NC DENR - Division of Water Resources

Surface Water Classifications

7.8 Wild and Scenic Rivers

The project is not located within one mile of any designated Wild and Scenic Rivers or a river in the Nationwide Rivers inventory or its tributaries.

7.9 Coastal Resources

The project is not located in a CAMA county.

7.10 Shellfish, Fish, and Their Habitats

In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

Aquatic communities in the project site consist of perennial streams. These perennial streams could support typical species such as chubs, darters, shiners, sunfish, bass, carp, and catfish. Typical habitat that supports these species of fish consists of slow to non-flowing water with an abundance of submerged vegetation, rocks as well as submerged logs and brush. Supporting documentation can be found in Appendix K.

Looking at the streams present throughout the larger project area, the larger streams are dominated by sand and silt substrates. Many are deeply incised and have abandoned their floodplains. Wetlands are uncommon in many of these floodplains. Tributaries and smaller second order streams across the entire project area occur over bedrock or gravel/cobble substrates that resist erosion and have retained their forested buffers.

There is no evidence of threatened or endangered species within the project site, the project area, or downstream from the proposed project and, therefore, will not be impacted by the proposed project.

Temporary disturbance to aquatic habitats could affect the behavior of or directly harm some aquatic species with less mobility. The re-establishment of natural stream bed elevations would allow recovery of habitat and species in the streams.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur

entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area.

There will be no operational impacts associated with the use of the SASS. There will be minimal operational impacts to aquatic species or habitats associated with the use of the Sewer Access Valve (SAV). While the SAV will allow for the lowering of the lake level more than is currently available, this additional lowering is not anticipated to have any greater environmental effect, to the lake or downstream of the lake, than the previous lake level reductions. The lake currently is lowered at 1-foot per day, per the requirement found in the Town of Lake Lure's NPDES Permit, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. The SAV will also allow for the controlled rise of the lake level. The flow rate used to raise the lake level will not change following the installation of the SAV. Once again, this flow rate is dictated by the Town of Lake Lure's NPDES permit.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. New development may introduce new impervious surfaces which, in turn, may increase surface water runoff. The velocity at which stormwater runoff may enter a stream may cause instability of the stream bank causing it to erode and impacting aquatic habitat. Untreated stormwater runoff could introduce pollutants and degrade water quality. New development could have adverse impacts on aquatic species if contaminants reach surface water sources. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper

Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will improve the integrity of existing streams and lakes in the project area, and substantially reduce the potential for breakages and associated SSOs.

Project Engineers will secure and adhere to the conditions of a NCDEMLR erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area to limit the amount of sediment that enters streams. All disturbed areas will be promptly seeded and vegetatively stabilized, if location allows. The Lake Lure Soil Erosion and Sedimentation Control Regulations must be followed for any future development.

The Rutherford County Watershed Ordinance details out proper management of development in order to protect property, control stream channel erosion, prevent increased flooding associated with new development, protect floodplains, wetlands, water resources, riparian buffers, riparian and aquatic ecosystems, and the general watershed in its entirety.

The Rutherford County Flood Damage Prevention Regulations and the Town of Lake Lure Flood Damage Prevention Ordinance promotes public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas.

The regulation/ordinance restricts and/or prohibits uses that are dangerous to health, safety, and property due to water or erosion hazards or that result in damaging increases in erosion, flood heights or velocities. They require that development vulnerable to floods be protected against flood damage at the time of initial construction and oversees control of the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters. The regulation/ordinance also controls filling, grading, dredging, and all other development that may increase erosion or flood damage. Finally, the regulation/ordinance prevents or regulates the construction of flood barriers that will unnaturally divert flood waters or which may increase flood hazards to other lands.

The Rutherford County Soil and Water Conservation District works to assist with agricultural conservation needs along with the NC Agricultural Cost Share Program, the Natural Resource Conservation Service, and the Farm Service Agency. The NC Agricultural Cost Share Program addresses agriculture's contribution to non-point source pollution and the inclusion of best management practices to improve the efficiency of farming operations while reducing the potential for surface and ground water pollution.

Section 404/401 of the Clean Water Protection Act requires a permit be obtained by any development that may result in a discharge into a water of the United States.

7.11 Wildlife and Natural Vegetation

In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

There are eight (8) terrestrial threatened and endangered species that have been seen at some point in time within ½ mile of the project site. These species include:

- American Peregrine Falcon (*Falco Peregrinus Anatum*), Endangered, found approximately ½ miles west/northwest of the project site.
- Indiana Bat (*Myotis Sodalist*), Endangered, found approximately ½ miles west/northwest of the project site.
- Northern Long-Eared Bat (*Myotis Septentrionalis*), Threatened, found approximately ½ miles west/northwest of the project site.
- Bald Eagle (*Haliaeetus Leucocephalus*), Threatened, found approximately ½ miles around the project site.
- Dwarf-flowered heartleaf (*Hexastylis naniflora*), Threatened, found approximately ½ miles around the project site.
- Small Whorled Pogonia (*Isotria Medeoloides*), Threatened, found approximately ½ miles around the project site
- White Irisette (*Sisyrinchium Dichotomum*), Endangered, found approximately ½ miles around the project site
- Rock Gnome Lichen (*Gymnoderma Lineare*), Endangered, found approximately ½ miles around the project site

Terrestrial communities in the project area are comprised of both natural and disturbed habitats that may support a diversity of wildlife species. These species were identified through the North Carolina National Heritage Program.

One invertebrate animal is listed as North Carolina special concern, broad river spiny crayfish (*Cambarus lenati*), is known from Rutherford County. Two invertebrate animals listed as North Carolina significantly rare, lampshade weaver (*Hypochilus coylei*) and

southeastern tigersnail (*Anguispira knoxensis*), are also known from Rutherford County. North Carolina special concern animals documented in Rutherford County include: eastern small-footed bat (*Myotis grisescens*), oldfield deer mouse (*Peromyscus polionotus*), timber rattlesnake (*Crotalus horridus*), cerulean warbler (*Setophaga cerulean*), and crevice salamander (*Plethodon yonahlossee*). North Carolina significantly rare animals documented in Rutherford County include: little brown bat (*Myotis lucifugus*), tricolored bat (*Perimyotis subflavus*), eastern spotted skunk (*Spilogale putorius*), blue-winged warbler (*Vermivora cyanoptera*), coal skink (*Plestiodon anthracinus*), and blue ridge gray-cheeked salamander (*Plethodon amplus*).

Rare plants identified in Rutherford County include: southern anemone (*Anemone berlandieri*), prairie anemone (*Anemone caroliniana*), spreading rockcress (*Arabis patens*), bog jack-in-the-pulpit (*Arisaema stewardsonii*), bradley's spleenwort (*Asplenium bradleyi*), American barberry (*Berberis canadensis*), dissected toothwort (*Cardamine dissecta*), American bittersweet (*Celastrus scandens*), red turtlehead (*Chelone obliqua*), Carolina thistle (*Cirsium carolinianum*), coastal virgin's-bower (*Clematis catesbyana*), piedmont horsebalm (*Collinsonia tuberosa*), spring coral-root (*Corallorhiza wisteriana*), hazel dodder (*Cuscuta coryli*), granite flatsedge (*Cyperus granitophilus*), pale coneflower (*Echinacea pallida*), purple coneflower (*Echinacea purpurea*), cliff spurge (*Euphorbia communtata*), large witch-alder (*Fothergilla major*), Virginia stickseed (*Hackelia virginiana*), smooth sunflower (*Helianthus laevigatus*), crested coralroot (*Hexalectris spicata*), rock fir-clubmoss (*Huperzia porophylla*), Georgia holly (*Ilex longipes*), piedmont quillwort (*Isoetes piedmontana*), dwarf juniper (*Juniperus communis* var. *depressa*), rough blazing-star (*Liatris aspera*), small-head blazing-star (*Liatris microcephala*), earle's blazing-star (*Liatris squarrulosa*), shale-barren blazing-star (*Liatris turgida*), red Canada lily (*Lilium canadense* ssp. *editorium*), fen orchid (*Liparis loeselii*), southern loosestrife (*Lysimachia tonsa*), glade milkvine (*Matelea decipiens*), sweet pinesap (*Mononeuria uniflora*), northern rattlesnake-root (*Nabalus albus*), divided-leaf ragwort (*Packera millefolium*), balsam ragwort (*Packera paupercula* var. *pupercula*), glade wild quinine (*Parthenium auriculatum*), shooting-star (*Primula meadia*), Allegheny plum (*Prunus alleghaniensis* var. *alleghaniensis*), Georgia oak (*Quercus georgiana*), dwarf chinquapin oak (*Quercus prinoides*), northern white beaksedge (*Rhynchospora alba*), clammy locust (*Robinia viscosa*), pursh's wild-petunia (*Ruellia humilis*), Alabama grape-fern (*Sceptridium jenmanii*), blunt-lobed grape-fern (*Sceptridium oneidense*), Appalachian skullcap

(*Scutellaria ovata* ssp. *rugosa* var. 1), mountain catchfly (*Silene ovata*), blue ridge carrion-flower (*Smilax lasioneura*), granite dome goldenrod (*Solidago simulans*), elm-leaf goldenrod (*Solidago ulmifolia*), yellow ladies'-tresses (*Spiranthes lucida*), mountain camelia (*Stewartia ovata*), narrow-leaved smooth aster (*Symphotrichum concinnum*), small-leaved meadowrue (*Thalictrum macrostylum*), Appalachian golden-banner (*Thermopsis millis*), Virginia spiderwort (*Tradescantia virginiana*), deerhair bulrush (*Trichophorum cespitosum*), a liverwort (*Plagiochila ludoviciana*), a moss (*Weissia sharpie*), spherical bulb nodding moss (*Pohlia lescuriana*), long-beaked water feather moss (*Platydictya confervoides*), dwarf apple moss (*Philonotis cernua*), variable fork moss (*Dicranella varia*), red fork moss (*Dicranella rufescens*), pygmy cyrto-hypnum moss (*Cyrto-hypnum pygmaeum*), Oersted's capylopus (*Campylopus oerstedianus*), rust foot moss (*Bryoerythrophyllum ferruginascens*), Rota's feather moss (*Brachythecium rotaenum*), matted feather moss (*Brachythecium populeum*), Mexican melon-moss (*Brachythecium systylium*), Appalachian cliff fern (*Woodsia appalachiana*), Appalachian filmy-fern (*Vandenboschia boschiana*), narrowleaf bluecurls (*Trichostema setaceum*), sweet white trillium (*Trillium simile*), and horned bladderwort (*Utricularia cornuta*).

Natural vegetation occurring within the greater project area includes upland hardwoods, bottomland hardwood, and developed areas. Bottomland hardwood forests contain red maple, sycamore, green ash, sweetgum, river birch, green ash, willow oak, and water oak as well as mosses, lichens, and ferns. Upland hardwood forests contain several oak and hickory species, tulip poplar, sourwood, sweetgum, and red maple as well as trilliums, longleaf woodoats, sedges, vines, and blazing-stars. Upland and bottomland hardwood forests in the project area support a variety of wildlife, including amphibians (spotted and slimy salamanders, gray tree frogs, and American toad), reptiles (black rat, racer, ringneck and copperhead snakes, box turtle, and five-lined skinks), birds (robins, mockingbirds, bluebirds, woodcock, turkey, blue jays, warblers, and hawks), and mammals (gray squirrels, skunk, white-tailed deer, short-tailed shrews, grey fox, opossum, raccoon, and red bat).

Within the proposed project service area, these habitats, particularly upland and bottomland hardwood forests, occur sporadically across the landscape. Fragmentation from agricultural and development activities has impacted most area forests. Continuous forests do occur, primarily along streams and rivers and adjacent floodplains where development and farming have been precluded.

No record of federally or state listed species is present within or adjacent to the project area as, again, this proposed project will occur along the backshore area of Lake Lure that is only visible at lower lake levels and do not provide adequate habitat to the above listed species.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area. The location of this construction will not directly impact any wildlife and natural areas.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. It is the construction of lateral sub-outs that may have a minor direct impact to wildlife and natural vegetation with the lateral stub-outs impacting an area of approximately 5' x 5' each. This area will be located just outside the high water level of the lake, in most cases on developed property, in lawn areas. When deciding the locations of the laterals, areas of least impact to the surrounding area will be preferred.

The movement of construction equipment could involve clearing of vegetation, which could temporarily disturb wildlife behavior. These disturbed access areas would likely be narrow enough not to present a break in habitat and therefore is not expected to change wildlife movement. Edge habitat along the proposed sewer lines would allow some invasive species encroachment, but given the current amount of similar species in the vegetated areas, community changes are unlikely. Movement of construction equipment will occur mainly within the backshore of Lake Lure. To reach this area, construction equipment will enter Lake Lure from existing boat launches and staging areas on City property adjacent to the dam. Also, all materials and personnel will likely be moved around the lake by barge originating from the above mentioned existing boat launches and staging areas.

It is anticipated there will be no operational impacts to any wildlife and natural vegetation within the project area.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. New development involving land clearing would result in the loss of habitat and separation of wildlife habitat making wildlife movement more difficult. The variety and amount of wildlife species would decrease as habitat loss and separation occur. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will improve the integrity of existing streams and lakes in the project area, and substantially reduce the potential for breakages and associated SSOs.

Project Engineers will secure and adhere to the conditions of a NCDEMLR erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area to limit the amount of sediment that enters streams. All disturbed areas will be promptly seeded and vegetatively stabilized, if location allows. The Lake Lure Soil Erosion and Sedimentation Control Regulations must be followed for any future development along with the Endangered Species Act, and the Fish and Wildlife Coordination Act.

The Town of Lake Lure's Section 92 – Zoning Regulations Ordinance defines Sensitive Natural Areas as: "Any area, which is sensitive or vulnerable to physical or biological alteration, as identified now or hereafter by the North Carolina Natural Heritage Program and which contains one or more of the following: (1) habitat, including nesting sites, occupied by rare or endangered species; (2) rare or exemplary natural ecological communities; (3) significant landforms, hydroforms, or geological features; or (4) other areas so designated by the North Carolina Natural Heritage Program, which are sensitive or vulnerable to physical or biological alteration." Section 92.207 of this Ordinance specifically states that no development or land disturbance activity may occur in sensitive natural areas.

The Rutherford County Watershed Ordinance details out proper management of development in order to protect property, control stream channel erosion, prevent increased flooding associated with new development, protect floodplains, wetlands, water resources, riparian buffers, riparian and aquatic ecosystems, and the general watershed in its entirety.

The Rutherford County Flood Damage Prevention Regulations and the Town of Lake Lure Flood Damage Prevention Ordinance promotes public health, safety, and general welfare and to minimize public and private losses due to flood conditions within flood prone areas. The regulation/ordinance restricts and/or prohibits uses that are dangerous to health, safety, and property due to water or erosion hazards or that result in damaging increases in erosion, flood heights or velocities. They require that development vulnerable to floods be protected against flood damage at the time of initial construction and oversees control of the alteration of natural floodplains, stream channels, and natural protective barriers, which are involved in the accommodation of floodwaters. The regulation/ordinance also controls filling, grading, dredging, and all other development that may increase erosion or

flood damage. Finally, the regulation/ordinance prevents or regulates the construction of flood barriers that will unnaturally divert flood waters or which may increase flood hazards to other lands.

The Rutherford County Soil and Water Conservation District works to assist with agricultural conservation needs along with the NC Agricultural Cost Share Program, the Natural Resource Conservation Service, and the Farm Service Agency. The NC Agricultural Cost Share Program addresses agriculture's contribution to non-point source pollution and the inclusion of best management practices to improve the efficiency of farming operations while reducing the potential for surface and ground water pollution.

Prior to future development within the project area, the Town of Lake Lure will consult and/or communicate with the US Fish & Wildlife Service to identify avoidance/minimization measures that might be needed as it relates to protected species.

7.12 Public Lands and Scenic, Recreational & State Natural Areas

There are 13 state or federal natural areas identified within a 5 miles radius of the project area from the center of Lake Lure. All work to be completed will be done along the backshore of Lake Lure and will not disturb any of the natural areas. Figure 7.9 shows the locations of public lands and scenic, recreational and state natural areas within the 5 mile radius. The following natural areas are found within the 5 mile radius of the project area.

- Lost Colony Coves/Raven Cliffs is a very high natural area located approximately 5 miles southwest of the project area.
- Cloven Cliffs/The Pinnacles is a very high natural area located approximately 4.55 miles southwest of the project area.
- Weed Patch Mountain/Joel Ridge is a high natural area located approximately 3 miles north of the project area.
- Rattlesnake Knob is a moderate natural area located approximately 5 miles northwest of the project area.
- Chimney Rock Natural Area is an exceptional natural area located approximately 2 miles west of the project area.
- Stony Mountain/Rich Mountain is a very high natural area located approximately 4 miles west of the project area.
- Bat Cave/Bluerock Mountain is an exceptional natural area located approximately 4 miles west of the project area.
- Bald Mountain/Round Top Mountain is an exceptional natural area located approximately 2 miles northwest of the project area.
- Rumbling Bald/Shumont Mountain/Cedar Knob is an exceptional natural area located approximately 0.9 miles northwest of the project area.
- Youngs Mountain/Kens Rock is a very high natural area located approximately 2.5 miles northeast of the project area.
- Worlds Edge/Sugarloaf Mountain is an exceptional natural area located approximately 2.5 miles southwest of the project area.
- Cane Creek Mountain is a very high natural area located approximately 1.5 miles southwest of the project area.
- Rotten Creek Headwater Slopes is a high natural area located approximately 4.5 miles southwest of the project area.

While there are 13 state or federal natural areas identified within a 5 mile radius of the project area, none of the above identified areas will be directly impacted by the construction of the proposed project. In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at

the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. The location of this construction will not directly impact the above mentioned state or federal natural areas.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area. The location of this construction will not directly impact the above mentioned state or federal natural areas.

It is anticipated there will be no operational impacts to any public lands and scenic, recreational, and state natural areas including the above listed natural areas.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Future development could affect public lands and scenic, recreational and state natural areas within the Service Area if allowed to occur within close proximity to these features. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what

is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

Project Engineers will secure and adhere to the conditions of a NCDEMLR erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area to limit the amount of sediment that enters streams. All disturbed areas will be promptly seeded and vegetatively stabilized, if location allows. The Lake Lure Soil Erosion and Sedimentation Control Regulations must be followed for any future development. Land clearing activities would be limited to restrictions detailed in the Town of Lake Lure Zoning Regulations and compared to the vision laid out in the Town of Lake Lure 2007-2027 Comprehensive Plan along with other applicable Land Use Regulations per the Rutherford County Planning and Development Ordinance.

State Natural Areas

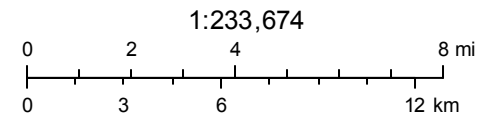
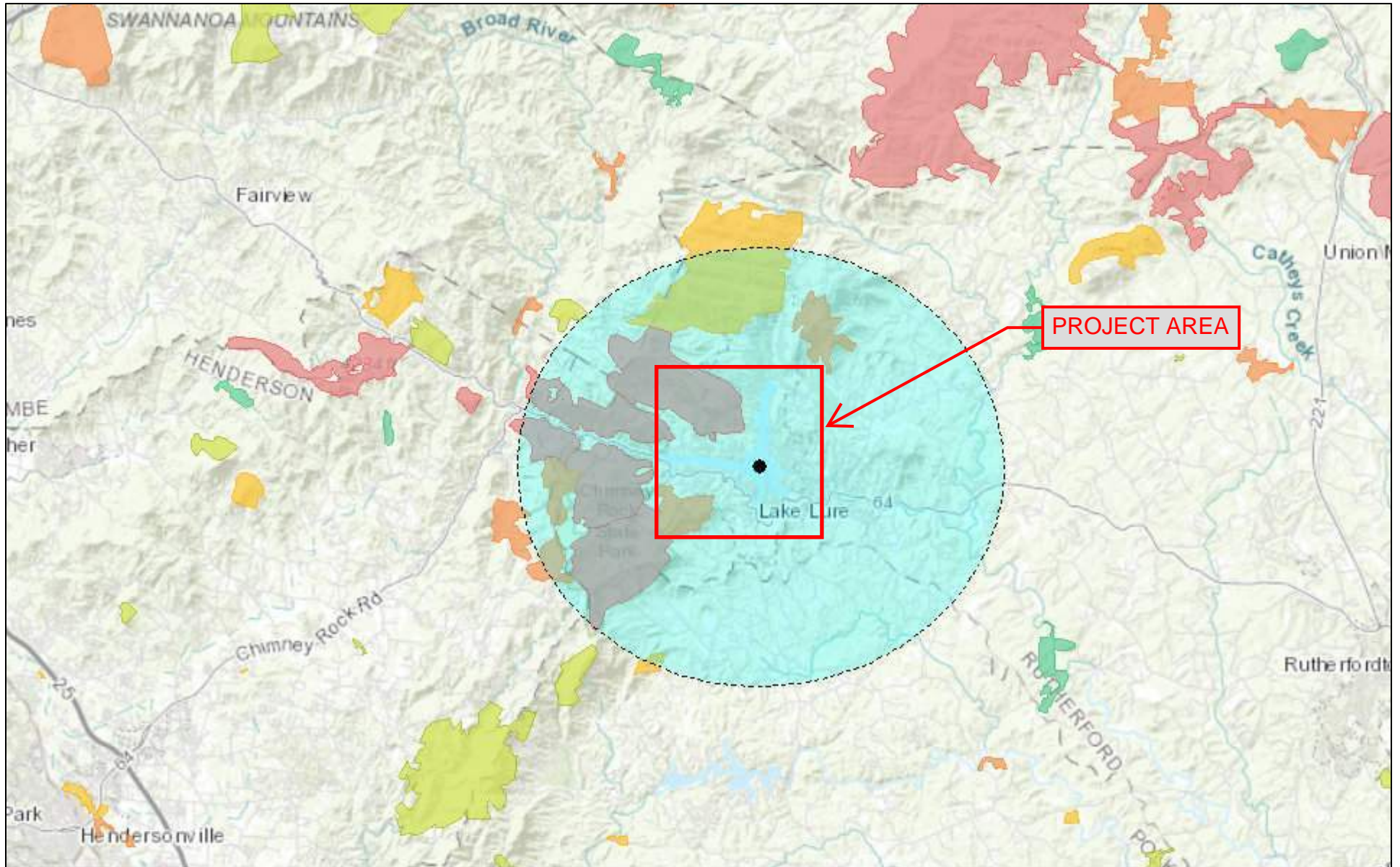


FIGURE 7.9

7.13 Areas of Archaeological or Historical Value

Using the NC National Register at <http://gis.ncdcr.gov/hpweb/>, it was determined there are no areas of archaeological or historical value within the immediate project site/area. There is one (1) area of archaeological or historical value identified within a 5 miles radius of the project area from the center of Lake Lure. Figure 7.10 shows the locations of areas of archaeological or historical value within the 5 mile radius. The following area of archaeological or historical value is found within the 5 mile radius of the project area:

- Pine Gables is located approximately 1.8 miles west of the project area and is included on the North Carolina National Register as a National Register Individual Resource.

In order to construct the replacement Subaqueous Sewer System (SASS) along the backshore area of Lake Lure, the lake will have to be lowered to enable construction 'in the dry'. This lowering has occurred in recent years to -12 feet, but not to the extent that is planned (-20 feet) for the installation of the sanitary sewer, including manholes and lateral stub-outs. However, this additional lowering is not anticipated to have any greater environmental effect than the previous lake level reductions. The lake currently is lowered at 1-foot per day, the lake would be lowered at the same rate prior to the beginning of construction and a held at that level during construction. By maintaining the same rate of flow, the environmental impact of the additional 8-feet would be the same as the preceding 12-feet. Once construction is complete, the water level will be returned to pre-construction levels and areas that were disturbed during construction will be underwater.

A small amount of construction will occur outside of the backshore area of Lake Lure to provide lateral connection stub-outs to the new sanitary sewer without having to do the future connection work within the lake. The location of this construction will not directly impact the above mentioned area of archaeological or historical value.

The installation of a Sewer Access Valve (SAV) will allow for the lake level to be decreased the additional 8-feet needed for SASS installation. The installation of the SAV will occur entirely within the footprint of the existing dam, and as such would have limited disturbed area. The environmental impact due to construction would be typical of facility based construction projects with those being the staging areas for delivery and equipment laydown. These impacts will be mitigated by applicable erosion control measures related to preventing sediment and debris from flowing out of the construction area. The location

of this construction will not directly impact the above mentioned area of archaeological or historical value.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Future development is likely to affect areas of archaeological or historical value within the Service Area. Historic buildings and archeological resources may be removed in the future to accommodate growth within the Service area, which could require coordination with SHPO, depending on the funding sources for the new development. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

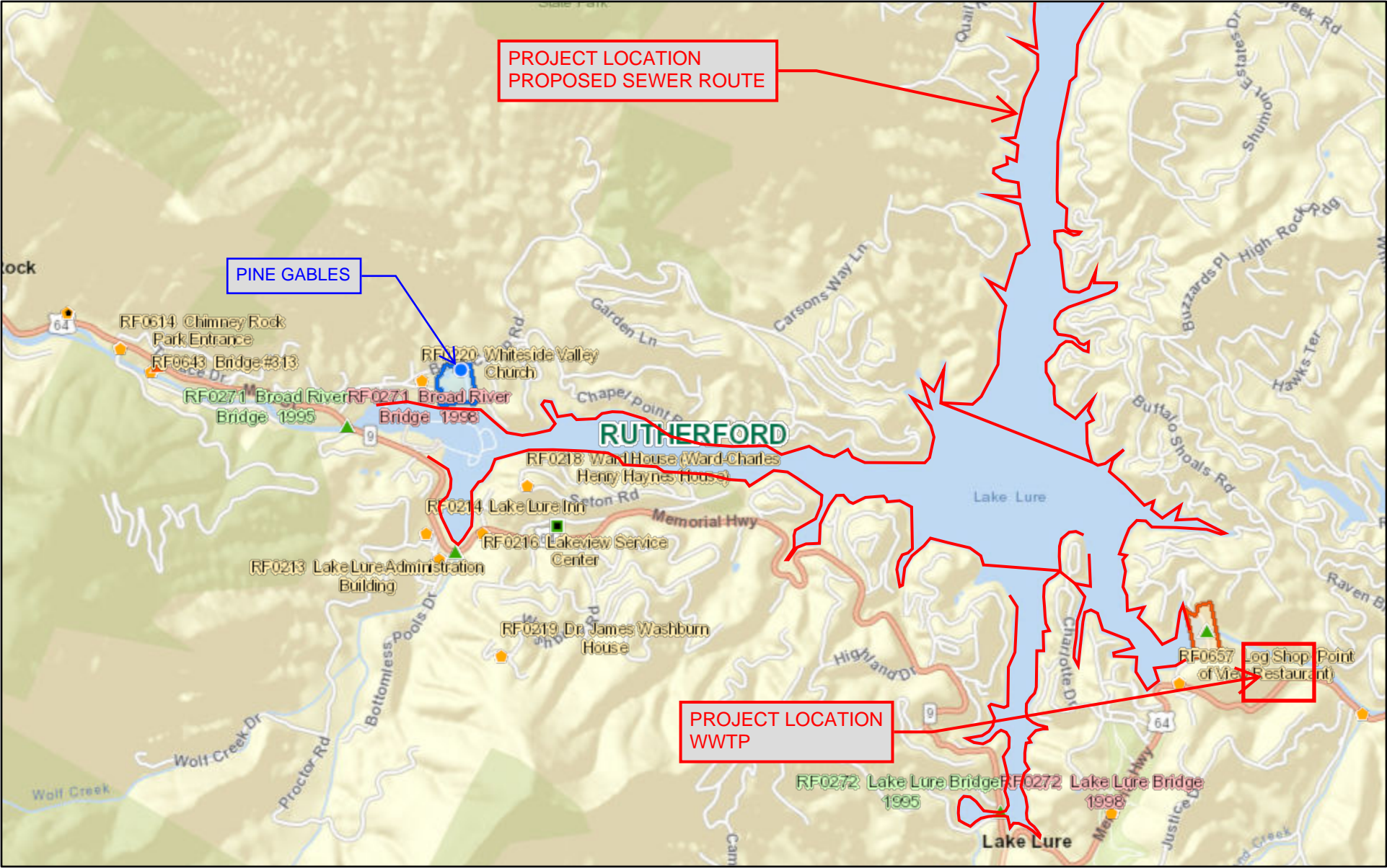
New development can involuntarily impact archaeological or historical resources and, depending on the funding sources for the new developments, review by SHPO may be required.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will reduce the potential for breakages and associated SSOs.

It is anticipated there will be no operational impacts to any areas of archaeological or historical value including that which is listed above.

Project Engineers will secure and adhere to the conditions of a NCDEMLR erosion and sedimentation control permit. All measures will be installed prior to any type of work occurring in an area to limit the amount of sediment that enters streams. All disturbed areas will be promptly seeded and vegetatively stabilized, if location allows. The Lake Lure Soil Erosion and Sedimentation Control Regulations must be followed for any future development. Land clearing activities would be limited to restrictions detailed in the Town of Lake Lure Zoning Regulations and compared to the vision laid out in the Town of Lake Lure 2007-2027 Comprehensive Plan along with other applicable Land Use Regulations per the Rutherford County Planning and Development Ordinance.

Areas of Archaeological or Historical Value



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- Local districts & boundaries
- Local Landmark, Gone
- Local individual resources & centerpoints
- Local Landmark
- ★ Local HD Center Point
- Surveyed Only
- Surveyed in NRHD
- Surveyed Only individual resources & centerpoints

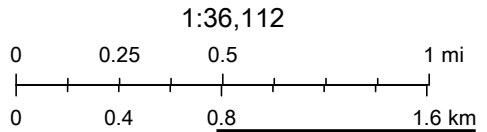


FIGURE 7.10

7.14 Air Quality

The project area is located in Rutherford County, North Carolina. The air quality in the area is generally very good. The county is not on any of the State of North Carolina's designation status lists for ozone, fine particulate matter, carbon dioxide, or sulfur dioxide and so is not classified as a nonattainment area. The greatest source of emissions in the project and surrounding area are from vehicle emissions. Odors have not been a problem in this area.

Impacts to the air quality near the project site will be temporary and localized. Most impacts will be limited to exhaust from construction equipment and wind-blown dust from exposed construction areas. Both potential impacts will be limited in time and scope to construction. Disturbed areas will be promptly reseeded to minimize erosion, which will also minimize wind-blown impacts. Impacts will cease once construction is complete.

Periodic odor complaints are to be expected with any wastewater collection and treatment system. However, no large increase in these complaints are anticipated. Operation of the Wastewater Treatment Plant will continue to impact air quality as it currently does. However, the project will not result in new air pollution sources.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Vehicle emission from additional traffic and industrial emissions attributed from a growing population is likely to contribute to higher levels of air pollution. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points,

making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

Prompt reseeding of construction areas will minimize wind-blown dust. Burning of materials will not be allowed.

Any future development would be required to adhere to the conditions detailed out in Section 31 of the Town of Lake Lure Code of Ordinances (Fire Protection Ordinance). This Ordinance follows the requirements of the North Carolina Fire Prevention Code. Burning of construction material is illegal.

The Town of Lake Lure 2007-2027 Comprehensive Plan addresses the changing dynamics of the area and provides a vision of where the Town wants to be. While development is expected to occur, through proper growth management and land use planning, development can maintain its course without jeopardizing the quality of the environment or the quality of life.

The Rutherford County Planning and Development Ordinance assists in regional planning and economic development. This ordinance promotes general welfare of the county lands and the environment surrounding those lands.

The Clean Air Act is a comprehensive Federal Law that regulates all sources of air emissions.

7.15 Noise Levels

Most of the project site and project area is urbanized. Typical noise sources expected around this area of the project include traffic and industrial and domestic sources. All sources of noise will be regulated through the Town of Lake Lure's Noise Regulation found in Chapter 84A of the Code of Ordinances.

Nuisance noise during construction will be limited to daylight hours (weekdays from 7am to 6 pm). Noise levels would return to pre-construction levels once construction is complete. No permanent increase in ambient noise levels would be associated with the project.

Operational impacts may come from the Wastewater Treatment Plant. However, this structure being existing, the noises (if any) are currently heard. Other operational noise impacts are not anticipated.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. A change in land use to residential and commercial would produce greater amount of noise from increased traffic on local roads, business operations, and domestic noise. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

Any increase in noise levels that arise during construction will decrease back to pre-construction levels following completion of construction.

Any future development would be required to adhere to the conditions detailed out in Chapter 84A of the Town of Lake Lure Code of Ordinances (Noise Ordinance). In this ordinance, noises that are expressly prohibited are listed along with exceptions. If necessary, permits will be required for any future development that will be unable to observe the requirements listed out in the noise ordinance.

The Town of Lake Lure 2007-2027 Comprehensive Plan addresses the changing dynamics of the area and provides a vision of where the Town wants to be. While development is expected to occur, through proper growth management and land use planning, development can maintain its course without jeopardizing the quality of the environment or the quality of life.

The Rutherford County Planning and Development Ordinance assists in regional planning and economic development. This ordinance promotes general welfare of the county lands and the environment surrounding those lands.

7.16 Introduction of Toxic Substances

During construction, toxic substances including fuels and lubricants may be introduced into the environment. These items, needed for construction equipment, would be located in a predetermined, contained area such that any spills would be better able to be controlled. Contractors will perform vehicle maintenance consistent with the need to minimize pollution. Fresh concrete used in or near surface waters will be prevented from entering any streams or surface water be disposed of in designated upland areas or fully cured before disposal.

Operational impacts may come from the Wastewater Treatment Plant. However, this structure being existing, measures are already taken to ensure toxic substances do not enter the environment. Other operational impacts involving toxic substances are not anticipated.

Secondary or cumulative impacts as a result of this project could involve new development that may arise within the Service Area. Construction for this new development could produce toxic substances that could enter the environment. Measures, similar to those taken during construction of the proposed project, would need to be in place to ensure toxic substances do not enter the environment. However, any new development that may occur is limited not only by the topography of the area surrounding the lake but also by the vacant land available for development. The vacant lands currently available for development are not large enough for a large development or industrial user. The capacity of the new subaqueous sewer system (SASS) will not be increased as a result of this project. Though due to its location within the lake, very little is known about the existing SASS, it is known that when it was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.

Positive secondary and cumulative impacts that will result from this project include decreased likelihood of pipe breakage, sanitary sewer overflows, reduced inflow and infiltration, and the reduction of septic tanks and septic drainage fields that drain into the lake.

No new areas are being provided with sewer service by this project. This project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

Any contamination discovered/caused during construction will be reported to the NCDEQ Asheville Regional Office. Protection of nearby water courses will be protected by following the Rutherford County Watershed Ordinance and groundwater protection requirements for NCDWQ.

The Rutherford County Watershed Ordinance details out proper management of development in order to protect property, control stream channel erosion, prevent increased flooding associated with new development, protect floodplains, wetlands, water resources, riparian buffers, riparian and aquatic ecosystems, and the general watershed in its entirety.

7.17 Environmental Justice Analysis

Evaluation of Environmental Justice is critical to ensure that minority and low-income segments of society are not subjected to disproportionate exposure to negative environmental factors.

Mapping provided by the EPA EJView Geographic Assessment Tool is shown on Figures 7.11 and 7.12 and shows percentiles of both minority and low-income populations.

Both the minority population and the low income population are low within the project area. The project does not disproportionately expose minority or low-income segments of the population to negative environmental factors.

The proposed project is mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks, benefitting all within the project area.

Percent Minority

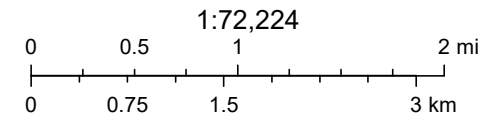
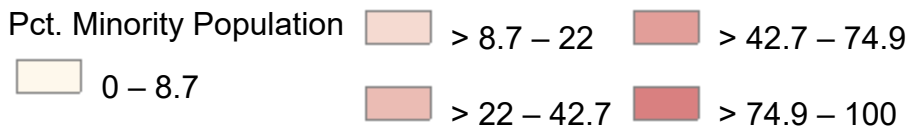
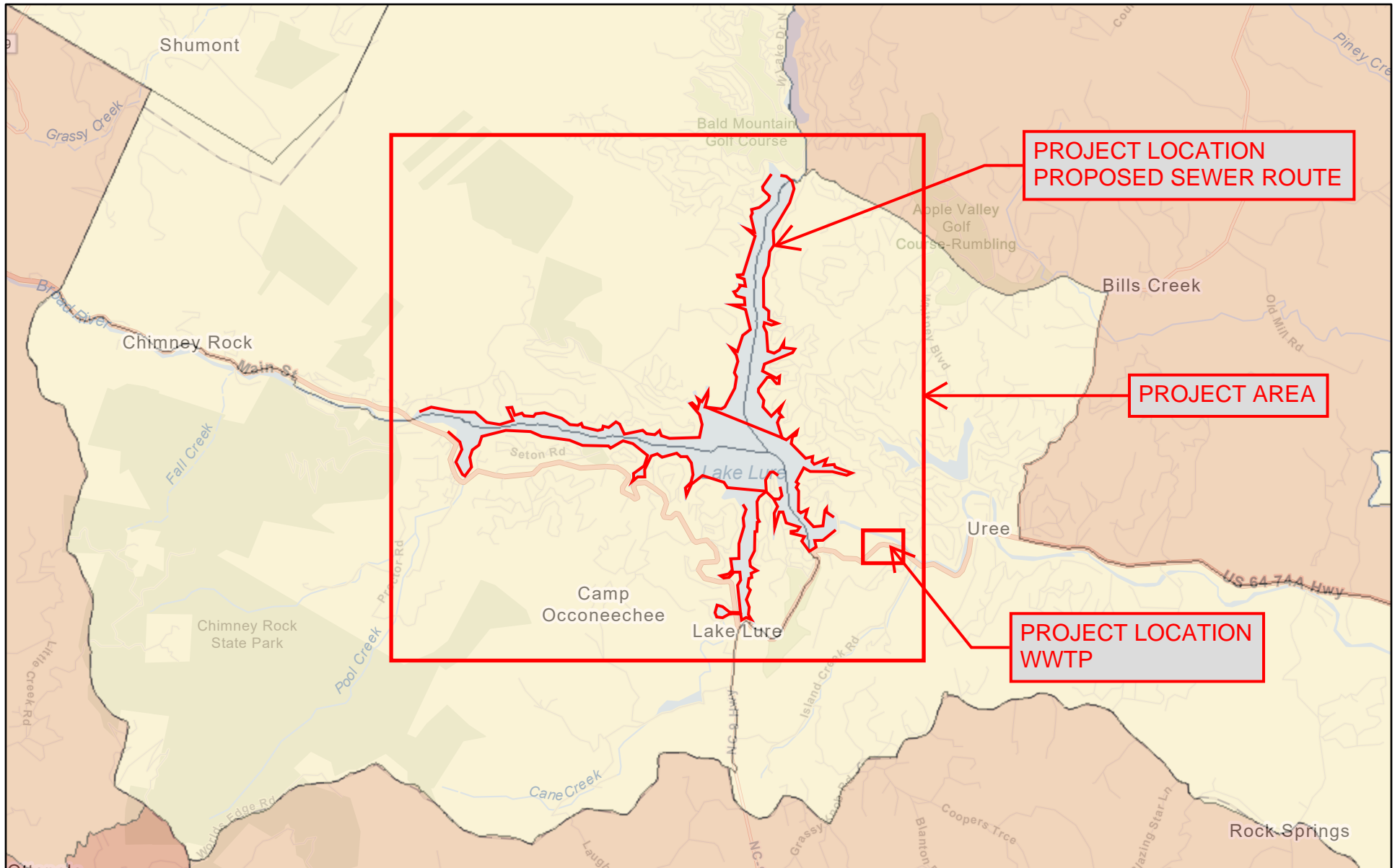
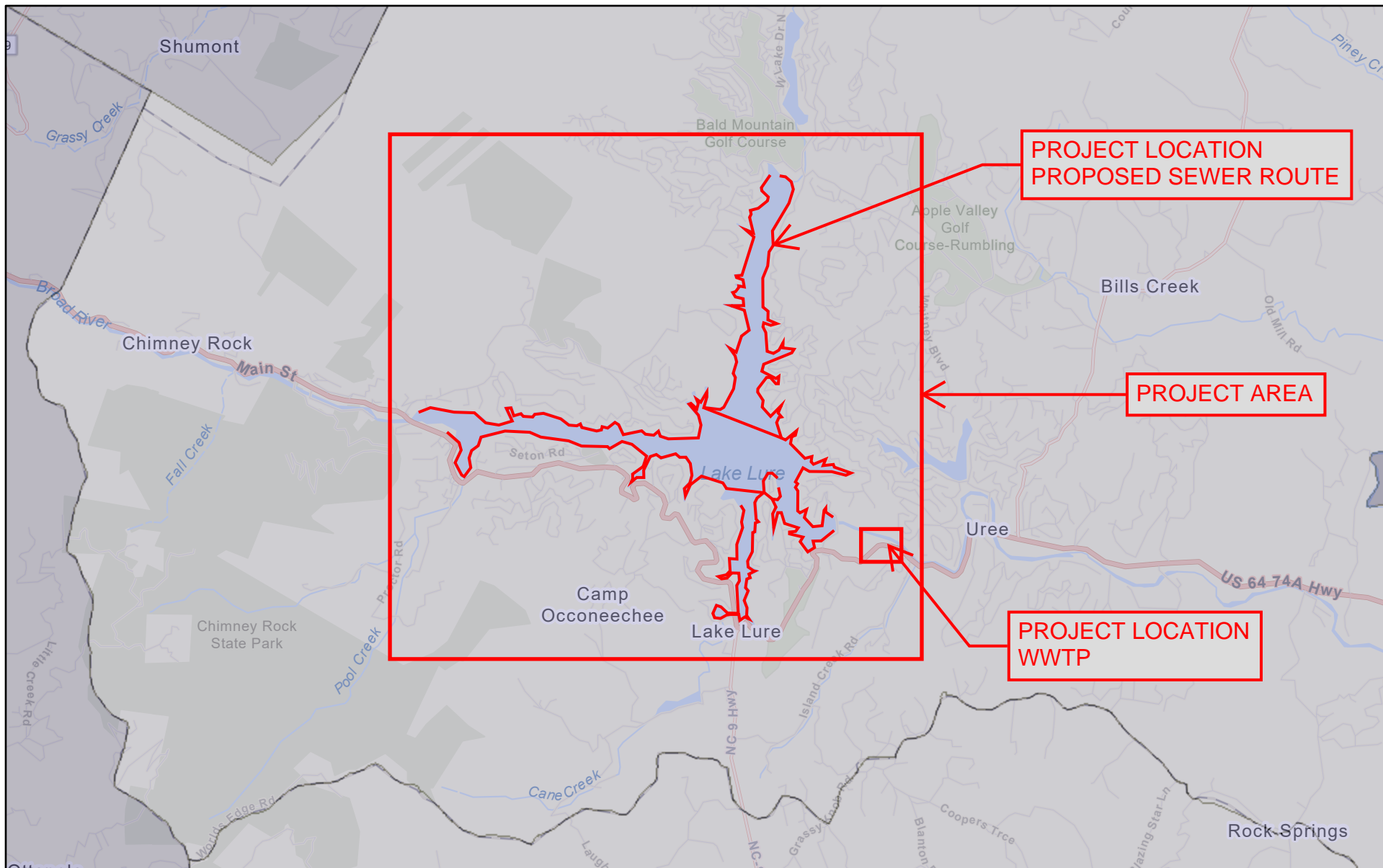


FIGURE 7.11

Percent Low Income



Pct. Population Below Poverty Level

0 – 5.8

> 5.8 – 10

> 10 – 15.5

> 15.5 – 24.7

> 24.7 – 100

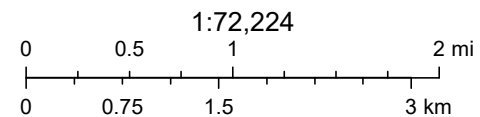


FIGURE 7.12

7.18 Mitigative Measures

Positive Second and Cumulative Impacts that will occur due to the proposed project apply to all resource categories listed below. These positive impacts are a result of this proposed project being mitigation for anticipated SSOs and associated soil contamination, inflow and infiltration, water quality impacts, and human health risks. This project will substantially reduce the potential for breakages and associated SSOs.

Table 7.1 Mitigative Measures Subaqueous Sanitary Sewer Replacement Town of Lake Lure				
Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Topography & Floodplains	Temporary land disturbance due to installation of the sanitary sewer.	Ground would be re-graded to pre-construction contours and conditions and re-seeded with vegetation, where location allows.	Potential new development within the service area. Development within the floodplain can reduce water storage and overall function, having adverse impacts on water quality and wildlife habitat.	Rutherford County Flood Damage Prevention Ordinance, Town of Lake Lure Flood Damage Prevention Ordinance

**Table 7.1 Mitigative Measures
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Soils	Temporary land disturbance due to installation of the sanitary sewer. Erosion possible.	Sedimentation and erosion control measures, as required by state and local regulations, would be installed prior to and maintained throughout the duration of the project. Disturbed areas would be re-seeded with vegetation, where applicable.	Potential new development within the service area. Land development could result in sedimentation migration and possible erosion. Sedimentation into adjacent waters may decrease water quality and degrade aquatic habitat.	State Sedimentation and Erosion Control Regulations, Chapter 96 of the Town of Lake Lure Ordinances (Erosion Control).
Prime & Unique Farmland	Temporary land disturbance due to installation of the sanitary sewer. Loss of farmland during construction.	Bury sanitary sewer below tith depth.	Potential new development within the service area. Land development could result in loss of farmland.	Farmland Protection Policy Act, Town of Lake Lure 2007-2027 Comprehensive Plan, Rutherford County Soil and Water Conservation District, Rutherford County Planning and Development Ordinance
Land Use	None.	None.	Potential new development within the service area. Development could decrease farmland and forested land and may require property to be re-zoned for specific use.	Town of Lake Lure Zoning Regulations, Town of Lake Lure 2007-2027 Comprehensive Plan, Rutherford County Planning and Development Ordinance, State Sedimentation and Erosion Control regulations, Chapter 96 of the Town of Lake Lure Ordinances (Erosion Control)

**Table 7.1 Mitigative Measures
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Forest Resources	Temporary land disturbance due to installation of the sanitary sewer.	Land clearing activities would be limited to restrictions found in the Gaston County Land Use Ordinances. Pile woody debris along construction corridor.	Potential new development within the service area. Loss of forest resources could reduce wildlife habitat.	Town of Lake Lure Zoning Regulations, Town of Lake Lure 2007-2027 Comprehensive Plan, Rutherford County Planning and Development Ordinance
Wetlands and Streams	Temporary land disturbance due to installation of the gravity sanitary sewer.	Land clearing activities would be limited to restrictions found in the Town of Lake Lure Zoning Regulations, Town of Lake Lure 2007-2027 Comprehensive Plan, and the Rutherford County Planning and Development Ordinance.	Potential new development within the service area. Loss of wetlands and streams could reduce aquatic habitat and water quality.	Rutherford County Watershed Ordinance, Rutherford County Flood Damage Prevention Ordinance, Town of Lake Lure Flood Damage Prevention Ordinance, Rutherford County Soil and Water Conservation District, Section 404/401 of the Clean Water Protection Act

**Table 7.1 Mitigative Measures
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Water Resources	Temporary disturbance due to installation of the sanitary sewer. Temporary increase in turbidity.	State Sedimentation and Erosion Control Regulations, Chapter 96 of the Town of Lake Lure Ordinances (Erosion Control), would be installed prior to and maintained throughout the duration of the project.	Potential new development within the service area. New development can increase runoff and impact water quality, stream stability, and aquatic habitat	Rutherford County Watershed Ordinance, Rutherford County Flood Damage Prevention Regulations, Town of Lake Lure Flood Damage Prevention Ordinance, Rutherford County Soil and Water Conservation District, Section 404/401 of the Clean Water Protection Act, State Sedimentation and Erosion Control Regulations, Chapter 96 of the Town of Lake Lure Ordinances (Erosion Control)
Wild and Scenic Rivers	N/A	N/A	N/A	N/A
Coastal Resources	N/A	N/A	N/A	N/A

**Table 7.1 Mitigative Measures
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Shellfish, Fish, and their Habitats	Temporary disturbance due to installation of the sanitary sewer. Temporary increase in turbidity.	Sedimentation and erosion control measures, as required by state and local regulations, would be installed prior to and maintained throughout the duration of the project.	Potential new development within the service area. New development can increase erosion, sedimentation, and introduce pollutants to streams which could impact aquatic habitat and water quality.	Endangered Species Act, Rutherford County Watershed Ordinance, Rutherford County Soil and Water Conservation District, Rutherford County Flood Damage Prevention Regulations, Town of Lake Lure Flood Damage Prevention Ordinance, Section 404/401 of the Clean Water Act
Wildlife and Natural Vegetation	Temporary disturbance due to installation of the sanitary sewer.	Disturbed areas will be re-seeded with native vegetation, where applicable.	Potential new development within the service area. Land clearing could result in the loss of habitat, lessening the quantity and diversity of wildlife species.	Endangered Species Act, Fish and Wildlife Coordination Act, Rutherford County Watershed Ordinance, Rutherford County Soil and Water Conservation District, Rutherford County Flood Damage Prevention Regulations, Town of Lake Lure Flood Damage Prevention Ordinance, Chapter 92 of the Town of Lake Lure Ordinances (Zoning Regulations), State Sedimentation and Erosion Control Regulations

**Table 7.1 Mitigative Measures
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Public Land and Scenic, Recreational, and State Natural Areas	No Impact.	None.	Potential new development within the service area. Land clearing could result in the loss of natural areas.	Town of Lake Lure Zoning Regulations, Town of Lake Lure 2007-2027 Comprehensive Plan, Rutherford County Planning and Development Ordinance
Areas of Archaeological or Historical Value	No Impact.	None.	Potential new development within the service area. New development could result in removal of potential archeological or historical structures.	NC State Historic Preservation Office (SHPO) review
Air Quality	Temporary impacts due to installation of the sanitary sewer and windblown dust prior to vegetation.	Prompt reseeding to stabilize disturbed soil, where applicable. Prohibit burning of materials.	Potential new development within the service area. New development may increase air pollution from additional traffic.	Town of Lake Lure 2007-2027 Comprehensive Plan, Rutherford County Planning and Development Ordinance, Clean Air Act
Noise Levels	Temporary increases in nuisance noise during the installation of the sanitary sewer.	Work to be performed during daylight hours (weekdays from 7 am to 6 pm).	Potential new development within the service area. New development may increase noise due to increased traffic, business operations, and domestic noise.	Town of Lake Lure Code of Ordinances – Section 84A, Town of Lake Lure 2007-2027 Comprehensive Plan, Rutherford County Planning and Development Ordinance

**Table 7.1 Mitigative Measures
Subaqueous Sanitary Sewer Replacement
Town of Lake Lure**

Resource Category	Potential Direct Impact	Mitigative Measure(s) for Direct Impact	Potential SCI	Mitigative Measures for SCI
Toxic Substances	Possible spills from construction equipment such as fuel, oil, and lubricants.	Contractors to perform maintenance away from streams and wetlands. Hazardous or toxic substances would be stored in a predetermined, contained area.	Potential new development within the service area. New development may increase the likelihood of toxic substances being introduced into the environment impacting water quality and habitats.	Rutherford County Watershed Ordinance
Environmental Justice	No Impact.	None.	Potential new development within the service area. New development may adversely affect minority or low income populations.	Executive Order 12898

Section 8.0 Financial Analysis

8.1 Determination of Rates to Median Household Income Percentage

The existing financial condition of the Town of Lake Lure must be looked at prior to analyzing the impact of the cost of the proposed project. Table 8.1 summarizes the current financial condition of the Town of Lake Lure.

Table 8.1. Applicant's/LGUs Financial Condition*		
Subaqueous Sanitary Sewer Replacement Backshore Gravity/Lift Stations		
Utility Bill as Percent of Median Household Income		
	Sewer Rate Structure	Water Rate Structure
Rate Structure:	Uniform	Uniform
Base Charge:	\$69.50	\$21.95
Thousands of Gallons in Base Charge:	0	0
Volumetric Charge per 1,000 gallons:	\$0.00	\$5.80
Monthly Bill for 5,000 gallons:	\$69.50	\$50.95
Combined Monthly Water and Sewer Bill for 5,000 gallons:	\$120.45	
Median Household Income:	\$63,125	
Monthly Median Household Income for LGU:	\$5,260	
Bill as % of Median Household Income:	1.32%	0.97%
Overall Bill as % of Median Household Income:	2.29%	

*This table includes older rates. The Town of Lake Lure has since increased these rates in order to be able to repay the SRF Loan for Phase 1 of the proposed overall project.

If the combined utility bill as a percent of the Median Household Income (%MHI) is greater than 4.00%, a financial hardship on users is expected. As the Town of Lake Lure's %MHI is less than 4.00% at 2.29%, there is currently no financial hardship on users.

8.2 Determination of Funding Sources and Loan Repayment

The total cost of the preferred alternate is \$12,500,000. The proposed project will be done in multiple phases as funding becomes available. The first phase of the project involves all work that can be completed for \$12,500,000, the amount of the loan received from the Clean Water State Revolving Fund (CWSRF). The description of the work that will be completed in this first phase can be found in Section 6.0. However, closing costs cannot be paid for with funds received from CWSRF. To cover the required 2.0% closing fee, or

\$250,000, funds from the Town of Lake Lure’s Capital Improvements Plan (CIP) will be used. A request has been made to increase the repayment of this CWSRF loan to over a 30-year period rather than the standard 20-year period. This request has been made in an effort to limit the increase in customer rates to amounts that may be beyond the ability of the customers to pay in order to pay back the loan over only 20-years. Rates have currently been raised in order to pay back the loan over a 30-year period. The following tables compare the costs associated with the loan over a 20-year and 30-year repayment timeframe. Table 8.2 details the proposed funding distribution for the project with a 30-year payback period while Table 8.2A details the proposed funding distribution for the project with a 20-year payback period.

Table 8.2. Funding Distribution - 30 years Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations					
	Funding Source ^a	Amount	Funding Type	Specified Interest Rate from LOIF ^c (if applicable)	Repayment Period (if applicable)
Main Division Funding ^b :	CWSRF-PF	\$500,000	Principal Forgiveness	0.00%	30
Funding 1:	CWSRF-0%	\$12,000,000	Loan	0.00%	30
Closing/Administrative Fee(s):		\$10,000	If Other, list:		
Total Funded Amount (minus applicable closing/administrative fee[s]):		\$12,500,000			
Total Project Cost (with closing/administrative fee[s]):		\$12,510,000			
^a For SRP grants, grant administrative fee is 1.5% of Total grant award.					
For SRP and SRF loans, loan administrative fee is 2.0% of Total loan award.					
^b LOIF is Letter of Intent to Fund issued by the Division.					

Table 8.2A. Funding Distribution - 20 years Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations					
	Funding Source ^a	Amount	Funding Type	Specified Interest Rate from LOIF ^c (if applicable)	Repayment Period (if applicable)
Main Division Funding ^b :	CWSRF-PF	\$500,000	Principal Forgiveness	0.00%	20
Funding 1:	CWSRF-0%	\$12,000,000	Loan	0.00%	20
Closing/Administrative Fee(s):		\$10,000	If Other, list:		
Total Funded Amount (minus applicable closing/administrative fee[s]):		\$12,500,000			
Total Project Cost (with closing/administrative fee[s]):		\$12,510,000			
^a For SRP grants, grant administrative fee is 1.5% of Total grant award.					
For SRP and SRF loans, loan administrative fee is 2.0% of Total loan award.					
^b LOIF is Letter of Intent to Fund issued by the Division.					

Loans funded through the Division of Water Infrastructure are simple interest loans with a level principle payment. This project received principle forgiveness for \$500,000 of the loan. The rest of the loan received a 0% interest rate as stated in the Letter of Intent to Fund. Table 8.3 lists the first year principle payment and interest payment based upon the current interest rate to be applied to the loan with a 30-year payback period. Table 8.3A lists the first year principle payment and interest payment based upon the current interest rate to be applied to the loan with a 20-year payback period.

Table 8.3. Year 1 Interest and Repayment - 30 year Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations					
	Funding Source	Total Funding Amount	Year 1 Principal Payment	Year 1 Interest Payment	Year 1 Total Payment (Principal + Interest)
Main DWI Funding :	CWSRF-PF	\$500,000	\$0	\$0	\$0
Funding 1:	CWSRF-0%	\$12,000,000	\$400,000	\$0	\$400,000
Total Payment @ Specified Interest Rate(s)^a:					\$400,000

^aThe interest rates are shown on Table 8.2.

Table 8.3A. Year 1 Interest and Repayment - 20 years Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations					
	Funding Source	Total Funding Amount	Year 1 Principal Payment	Year 1 Interest Payment	Year 1 Total Payment (Principal + Interest)
Main DWI Funding :	CWSRF-PF	\$500,000	\$0	\$0	\$0
Funding 1:	CWSRF-0%	\$12,000,000	\$600,000	\$0	\$600,000
Total Payment @ Specified Interest Rate(s)^a:					\$600,000

^aThe interest rates are shown on Table 8.2A.

8.3 Determination of User Fee Increases

It is important to determine how the cost of the proposed project and the loan received to fund the project will impact residential user fees. Table 8.4 calculates the cost to treat 5,000 gallons of wastewater due to the proposed project for the first year based upon the interest rate of 0% and a 30-year payback period. Table 8.4A calculates the cost to treat 5,000 gallons of wastewater due to the proposed project for the first year based upon the interest rate of 0% and a 20-year payback period.

Table 8.4. User Fee Increase Due to Project - 30 years Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations							
Select Customer Type for Financing Project^c		Usage Per Month (gallons)	Number of Connections	Water Usage by Customer Type (gallons)	Total Monthly Water Usage for Customer Base (gallons):		5,160,000
<input checked="" type="checkbox"/>	Residential	5,000	926	4,630,000	# of 5,000 Gallon Units to Finance Project:		1,032
<input checked="" type="checkbox"/>	Non-Residential	5,000	106	530,000	Year 1 O&M Expenses Due to Project:		
	Funding Source	Year 1 Annual Repayment	Year 1 Annual O&M Costs	Total Year 1 Annual Costs @ Specified Interest Rate	Year 1 Monthly Costs @ Specified Interest Rate	Gallons Due to Project @ Specified Interest Rate (All Users)	Gallons Due to Project @ Specified Interest Rate (Residential Users Only)
DWI Main Funding Source:	CWSRF-PF	\$0	\$0	\$0	\$0	\$0.00	\$0.00
Funding Source 1:	CWSRF-0%	\$400,000	106	\$400,000	\$33,333	\$32.30	\$36.00
Total Year 1 Annual Cost @ Specified Interest Rate:				\$400,000			
Total Year 1 Monthly Cost @ Specified Interest Rate:					\$33,333		
Total Monthly Cost to Treat 5,000 Gallons @ Specified Interest Rate:						\$32.30	
Total Monthly Cost to Treat 5,000 Gallons @ Specified Interest Rate (Residential Users Only):							\$36.00

Table 8.4A. User Fee Increase Due to Project - 20 years Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations							
Select Customer Type for Financing Project^c		Usage Per Month (gallons)	Number of Connections	Water Usage by Customer Type (gallons)	Total Monthly Water Usage for Customer Base (gallons):		5,160,000
<input checked="" type="checkbox"/>	Residential	5,000	926	4,630,000	# of 5,000 Gallon Units to Finance Project:		1,032
<input checked="" type="checkbox"/>	Non-Residential	5,000	106	530,000	Year 1 O&M Expenses Due to Project:		
	Funding Source	Year 1 Annual Repayment	Year 1 Annual O&M Costs	Total Year 1 Annual Costs @ Specified Interest Rate	Year 1 Monthly Costs @ Specified Interest Rate	Gallons Due to Project @ Specified Interest Rate (All Users)	Gallons Due to Project @ Specified Interest Rate (Residential Users Only)
DWI Main Funding Source:	CWSRF-PF	\$0	\$0	\$0	\$0	\$0.00	\$0.00
Funding Source 1:	CWSRF-0%	\$600,000	106	\$600,000	\$50,000	\$48.45	\$54.00
Total Year 1 Annual Cost @ Specified Interest Rate:				\$600,000			
Total Year 1 Monthly Cost @ Specified Interest Rate:					\$50,000		
Total Monthly Cost to Treat 5,000 Gallons @ Specified Interest Rate:						\$48.45	
Total Monthly Cost to Treat 5,000 Gallons @ Specified Interest Rate (Residential Users Only):							\$54.00

As of Fiscal Year 2018-2019, the monthly sewer bill to treat 5,000 gallons of wastewater is \$69.50. At the current interest rate, with a 30-year payback period, the new sewer bill for all users would need to be increased to a cost of \$101.80. The new sewer bill considering residential users only would be increased to a cost of \$105.50. Table 8.5 details the new residential sewer bill as well as the new residential water and sewer bill due to the proposed project, including the percentage increase of those bills.

Table 8.5. Impacts to User Rates - 30 years Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations			
Current Sewer Bill (\$/5,000 gallons):	\$69.50		
Current Water Bill (\$/5,000 gallons):	\$50.95		
Current - Combined Water & Sewer Bill (\$/5,000 gallons):	\$120.45		
	Funding Source	User Rate Increase Due to Project @ Specified Interest Rate (All Users)	User Rate Increase Due to Project @ Specified Rate (Residential Users Only)
Main IFS Funding Source:	CWSRF-PF	\$0.00	\$0.00
Funding Source 1:	CWSRF-0%	\$32.30	\$36.00
Total User Rate Increase Due to DWI Loan(s) (\$/5,000 gal.):		\$0.00	\$0.00
Total Increase Due to All Loans(s) (\$/5,000 gal.):		\$32.30	\$36.00
New Sewer Bill Due to DWI Loan(s) (\$/5,000 gal.):		\$69.50	\$69.50
New Sewer Bill Due to All Loan(s) (\$/5,000 gal.):		\$101.80	\$105.50
Percent Change in Sewer Bill Due to DWI Loan(s):		0.00%	0.00%
Percent Change in Sewer Bill Due to All Loan(s):		46.47%	51.79%
New Sewer & Water Bills Due to DWI Loan(s) (\$/5,000 gal.):		\$120.45	\$120.45
New Water & Sewer Bills Due to All Loan(s) (\$/5,000 gal.):		\$152.75	\$156.45
Percent Change in Sewer & Water Bills Due to DWI Loan(s):		0.00%	0.00%
Percent Change in Sewer & Water Bills Due to All Loan(s):		26.82%	29.89%

^aChange in User Fee to finance DWI Loan.

^bChange in User Fee to finance ALL funding sources.

As of Fiscal Year 2018-2019, the monthly sewer bill to treat 5,000 gallons of wastewater is \$69.50. At the current interest rate, with a 20-year payback period, the new sewer bill for all users would need to be increased to a cost of \$117.95. The new sewer bill considering residential users only would be increased to a cost of \$123.50. Table 8.5A details the new residential sewer bill as well as the new residential water and sewer bill due to the proposed project, including the percentage increase of those bills.

Table 8.5A. Impacts to User Rates - 20 years Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations			
Current Sewer Bill (\$/5,000 gallons):	\$69.50		
Current Water Bill (\$/5,000 gallons):	\$50.95		
Current - Combined Water & Sewer Bill (\$/5,000 gallons):	\$120.45		
	Funding Source	User Rate Increase Due to Project @ Specified Interest Rate (All Users)	User Rate Increase Due to Project @ Specified Rate (Residential Users Only)
Main IFS Funding Source:	CWSRF-PF	\$0.00	\$0.00
Funding Source 1:	CWSRF-0%	\$48.45	\$54.00
Total User Rate Increase Due to DWI Loan(s) (\$/5,000 gal.):		\$0.00	\$0.00
Total Increase Due to All Loans(s) (\$/5,000 gal.):		\$48.45	\$54.00
New Sewer Bill Due to DWI Loan(s) (\$/5,000 gal.):		\$69.50	\$69.50
New Sewer Bill Due to All Loan(s) (\$/5,000 gal.):		\$117.95	\$123.50
Percent Change in Sewer Bill Due to DWI Loan(s):		0.00%	0.00%
Percent Change in Sewer Bill Due to All Loan(s):		69.71%	77.69%
New Sewer & Water Bills Due to DWI Loan(s) (\$/5,000 gal.):		\$120.45	\$120.45
New Water & Sewer Bills Due to All Loan(s) (\$/5,000 gal.):		\$168.90	\$174.45
Percent Change in Sewer & Water Bills Due to DWI Loan(s):		0.00%	0.00%
Percent Change in Sewer & Water Bills Due to All Loan(s):		40.22%	44.83%

^aChange in User Fee to finance DWI Loan.

^bChange in User Fee to finance ALL funding sources.

8.4 Determination of Impacts to the Utility Bill per the Percent Medium Household Income

The impact of the additional costs on user charges can be determined by calculating the new utility bill as a percent of the Median Household Income (%MHI). The median household income is \$65,125. To cover the cost of a 30-year loan payment time period, considering only revenue generated by residential customers, the new residential sewer bill at the current interest rate following the completion of the proposed project would have to be increased to \$105.50. This equates to a %MHI of 2.01%. With the additional cost, the Town of Lake Lure's %MHI is slightly greater than 2.0% for the single bill. The new combined residential water and sewer bill at the current interest rate following the completion of the proposed project would have to be increased to \$156.45. This equates to a %MHI of 2.97%. Even with the additional cost, the Town of Lake Lure's %MHI is still less than 4.0% for the combined bill. With the %MHIs below the value threshold set to signify a financial hardship to users who receive a combined bill, the cost of the project would not add any financial hardship to users in order to cover the cost of the loan payment. Table 8.6 details the impact to the sewer bill as well as the water and sewer bill due to the proposed project, including the new %MHI.

Table 8.6. Impact to Bills Due to Project - 30 year Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations					
Sewer Bill as % Monthly MHI:		1.32%	Water Bill as % Monthly MHI:		0.97%
Current Sewer Bill (\$/5,000 gal.):		\$69.50	Current Water Bill (\$/5,000 gal.):		\$50.95
Current Sewer & Water Bill (\$/5,000 gal.):		\$120.45	Sewer & Water Bill as % Monthly MHI:		2.29%
Monthly MHI for LGU:		\$5,260			
		Sewer Bill Due to DWI Loans	Sewer Bill Due to All Loans	Water & Sewer Bills Due to DWI Loans	Water & Sewer Bills Due to All Loans
Specified Interest Rate (All Users)	New	\$69.50	\$101.80	\$120.45	\$152.75
	New %MHI Due to Project	1.32%	1.94%	2.29%	2.90%
	Potentially Significant Impact?	No	No	No	No
Specified Interest Rate (Residential Users Only)	New	\$69.50	\$105.50	\$120.45	\$156.45
	New %MHI Due to Project	1.32%	2.01%	2.29%	2.97%
	Potentially Significant Impact?	No	Yes	No	No
<i>If the user fee increases will be significantly increased, discuss why the LGU has determined to proceed with the project.</i>					
The user fees will not be significantly increased.					
<i>If a different financial model has been used to determine project financing, then discuss how the Applicant will accommodate the project in terms of financing it.</i>					
N/A					

To cover the cost of a 20-year loan payment time period, considering only revenue generated by residential customers, the new residential sewer bill at the current interest rate following the completion of the proposed project would have to be increased to \$123.50. This equates to a %MHI of 2.35%. With the additional cost, the Town of Lake Lure's %MHI is greater than 2.0% for the single bill. The new combined residential water and sewer bill at the current interest rate following the completion of the proposed project would have to be increased to \$174.45. This equates to a %MHI of 3.32%. Even with the additional cost, the Town of Lake Lure's %MHI is still less than 4.0% for the combined bill. With the %MHIs below the value threshold set to signify a financial hardship to users who receive a combined bill, the cost of the project would not add any financial hardship to users in order to cover the cost of the loan payment. However, with the %MHIs above the value threshold set to signify a financial hardship to users who receive only a sewer bill, the cost of the project would add financial hardship to users in order to cover the cost of the loan payment. Table 8.6A details the impact to the sewer bill as well as the water and sewer bill due to the proposed project, including the new %MHI.

Table 8.6A. Impact to Bills Due to Project - 20 year Subaqueous Sanitary Sewer Replacement Town of Lake Lure Backshore Gravity/Lift Stations					
Sewer Bill as % Monthly MHI:		1.32%	Water Bill as % Monthly MHI:		0.97%
Current Sewer Bill (\$/5,000 gal.):		\$69.50	Current Water Bill (\$/5,000 gal.):		\$50.95
Current Sewer & Water Bill (\$/5,000 gal.):		\$120.45	Sewer & Water Bill as % Monthly MHI:		2.29%
Monthly MHI for LGU:		\$5,260			
		Sewer Bill Due to DWI Loans	Sewer Bill Due to All Loans	Water & Sewer Bills Due to DWI Loans	Water & Sewer Bills Due to All Loans
Specified Interest Rate (All Users)	New	\$69.50	\$117.95	\$120.45	\$168.90
	New %MHI Due to Project	1.32%	2.24%	2.29%	3.21%
	Potentially Significant Impact?	No	Yes	No	No
Specified Interest Rate (Residential Users Only)	New	\$69.50	\$123.50	\$120.45	\$174.45
	New %MHI Due to Project	1.32%	2.35%	2.29%	3.32%
	Potentially Significant Impact?	No	Yes	No	No
<i>If the user fee increases will be significantly increased, discuss why the LGU has determined to proceed with the project.</i>					
The user fees will not be significantly increased.					
<i>If a different financial model has been used to determine project financing, then discuss how the Applicant will accommodate the project in terms of financing it.</i>					
N/A					

8.5 Future Project Phase Financing

As mentioned in Sections 1.1 and 1.3.2, due to the magnitude of the issues with the existing wastewater collection system, the project must be phased. The phasing consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. Section 1.3.2 provides an estimated timeframe to complete those phases, however, an additional component to completing the future phases is the financing of those phases.

The financial plan to fund Phase 1 and all future phases proposes three (3) significant increases in sewer rates along with the application of an annual inflation estimate of 3.5% to meet the anticipated debt service requirements within the ten-year horizon. The first significant increase of 30% has already been implemented in fiscal year 2020 and will cover the initial State Revolving Fund (SRF) loan of \$12.5M. This first sewer increase has been presented to the Town of Lake Lure (Town) residents via a community forum that is available for public review in the Town's website. The current Town budget is structured to immediately assume the expected debt service of Phase 1 design and construction.

The first SRF loan will source revenue for infrastructure that directly services existing sewer customers. After completion of each phase of construction, there is an opportunity

to leverage sewer capacity to assume new customers that will provide additional cash reserves through sewer development fees and increased cash flow through expanded sewer user or availability fees. The Town intends to mandate the connection of all residential and commercial sewer effluent to the new system when available. This mandate generally extends to all existing and potential customers that have lakefront access and sewer service available.

To fund future phases, it is anticipated to raise the sewer rates in two (2) steps by 20% each time. While current sewer rates for the Town are among the top rates for North Carolina municipalities, subsequent significant increases are feasible, but will cause rates to significantly exceed the sewer rate norms of the State. The Town has therefore provided a framework of other options to fund subsequent design and construction phases to mitigate the sole dependence on the sewer and water fund.

The Town of Lake Lure (Town), is also looking to impose sewer development fees to new customers and would set rates consistent with the size of living space for the new customer. In addition, once a phase becomes operational and a service lateral becomes available to non-existing customers, an Availability Fee would be charged as an incentive to configure septic or other systems into the new sewer. It is estimated that the number of potential new customers will expand the customer base by up to 50% within each phase. Sewer Development Fees and Availability Fees would provide a significant and immediate source of new revenues to form a capital reserve and increase cash flow to source follow-on phases of design and construction.

The Town of Lake Lure will also pursue additional sources of revenue from grants (as they become available) and the Town's general fund, sourced from ad-valorem taxes. In general, the Town recognizes that sewer infrastructure should be sourced from sewer user fees, but the Town is seeking the authority through Special State legislation to apply ad-valorem revenues to this project. This will link property taxes at large to a portion of the revenue sourcing for the sewer infrastructure and will allow the Town to leverage all property owners, rather than limiting the sourcing only to current users, to fund subsequent phases.

The combined effect of new sewer development revenue, imposition of availability fees, application of general fund dollars, payoff of previous debt service, and increased

operational efficiencies as the new system becomes operational over the next ten years will mitigate the need to raise sewer rates to unprecedented levels.

Section 9.0 Public Participation

9.1 Level of Public Involvement

The level of public involvement for a project depends upon the type of funding the project will be receiving, the type of environmental document needed, and the type project. Funding for the project will be through the Clean Water State Revolving Fund (CWSRF) Program. As this proposed project will require procurement of a Finding of No Significant Impact (FONSI), this project is considered a major project. Therefore, a high level of public involvement will be required.

9.2 Public Meeting Requirements

The Division of Water Infrastructure requires more public involvement if a project requires a FONSI as a final environmental document. Due to the proposed project's funding source and major project status requiring a FONSI, a high level of public involvement is required, specifically in the form of a public meeting. This meeting must be held prior to any FONSI being sent to the State Clearing House for review. The process involves advertising the notice for the public meeting, holding the public meeting, and reporting on the public meeting. All this information will be used to draft the FONSI.

APPENDIX A

Submittal Checklist

Submittal Checklist for Engineering Reports/Environmental Information Documents

(Last updated: May 2017)

This checklist must accompany the initial submittal of all Engineering Reports/Environmental Information Documents. If your submittal does not contain this checklist, the Project Manager will not start review until it is received.

A. Number of Reports Submitted

Number of Copies Submitted: 2 copies 4 copies (FONSIs only) Other:

B. Contact Information

Owner Information

Is the contact person (Elected Official or Authorized Representative) different from the application? Yes No

First Name Shannon	Last Name Baldwin	Suffix	Position Town Manager	<input type="checkbox"/> Elected Official <input checked="" type="checkbox"/> Authorized Representative	
Mailing Address 1 PO Box 255		Mailing Address 2		City Lake Lure	State NC
E-Mail Address townmgr@townoflakelure.com		Phone Number (828) 625-9983		Extension (if applicable) 101	

Consultant Information

Is the contact person different from the application? Yes No

Firm Name LaBella Associates	First Name Maurice	Last Name Walsh	Suffix
Mailing Address 1 400 S. Tryon Street	Mailing Address 2 Suite 1300	City Charlotte	State NC
E-Mail Address mwalsh@labellapc.com		Phone Number (704)941-2128	Extension (if applicable)

Environmental Information Document Contact Information

Did a separate firm prepare the Environmental Information Document? Yes No

If Yes, complete the information below. If No, then continue to Part C (Project Information).

Firm Name	First Name	Last Name	Suffix
Mailing Address 1	Mailing Address 2	City	State
E-Mail Address		Phone Number	Extension (if applicable)

C. Project Information

Project Name

Subaqueous Sanitary Sewer Replacement

Project Type

Check all that apply in terms of project type. Note that for the CDBG-I program, projects in both wastewater and water may be checked.

<input checked="" type="checkbox"/> Wastewater Treatment Plant Equipment Repair and Replacement <input type="checkbox"/> Wastewater Treatment Plant Expansion <input checked="" type="checkbox"/> Collection System Rehabilitation and Replacement <input type="checkbox"/> Collection System Expansion <input type="checkbox"/> Reclaimed Water <input type="checkbox"/> Stormwater Best Management Practices <input type="checkbox"/> Stream/Buffer/Wetland Restoration <input type="checkbox"/> Rainwater Harvesting	<input type="checkbox"/> Water Treatment Plant Equipment Repair and Replacement <input type="checkbox"/> Water Treatment Plant Expansion <input type="checkbox"/> Water Line Rehabilitation and Replacement <input type="checkbox"/> Water Storage Repair/Replacement/Expansion <input type="checkbox"/> Water Source Development
--	---

D. Environmental Information

Check the box for the appropriate final information document required for the project and based upon the minor construction activities listed in Appendix A of the guidance (CWSRF, DWSRF, WW-SRP, and DW-SRP only), and any discussion with Division staff. Note: Under the CDBG-I program, the Responsible Entity will be in charge of the environmental review process. The Consultant should check which environmental document the Responsible Entity is preparing.

Final Environmental Document

- Certificate of Exemption (CDBG-I only)
- Categorical Exclusion Subject to §58.5 (CDBG-I only)
- Categorical Exclusion (CWSRF and DWSRF only)
- Approval Only (WW-SRP and DW-SRP)
- Categorical Exclusion Not Subject to §58.5 (CDBG-I only)
- Finding of No Significant Impact (all funding programs)
- Record of Decision (all funding programs)

Check the box(es) for the river basin(s) where the project is found. This information is used for programmatic reporting purposes.

- Broad
- Cape Fear
- Catawba
- Chowan
- French Broad
- Hiwassee
- Little Tennessee
- Lumber
- Neuse
- New
- Pasquotank
- Roanoke
- Savannah
- Tar-Pamlico
- Watauga
- White Oak
- Yadkin

E. Funding Information

Estimated Project Cost

Provide the estimated Project Cost: \$12,750,000

Funding Source(s)

Check the box(es) for each source of funding, including those outside of the Division. Place the amount(s) in the appropriate column.

<input checked="" type="checkbox"/> CWSRF	\$ 12,500,000	<input type="checkbox"/> North Carolina Rural Center	\$
<input type="checkbox"/> DWSRF	\$	<input type="checkbox"/> USDA Grant/Loan	\$
<input type="checkbox"/> CDBG-I	\$	<input type="checkbox"/> Bonds	\$
<input type="checkbox"/> WW-SRP	\$	<input checked="" type="checkbox"/> Local Funds	\$ 250,000
<input type="checkbox"/> DW-SRP	\$	<input type="checkbox"/> Bank Loans	\$
		<input type="checkbox"/> Other, Specify:	\$

F. Signature

This submittal checklist has been completed and is, to the best of my knowledge, accurate.

Signature:

Date: 9/15/2020

APPENDIX B

Collection and Treatment Systems Evaluation
Subaqueous Sanitary Sewer Inventory



Collection and Treatment Systems Evaluation

June 9, 2020

Maurice J. Walsh, P.E.



Table of Contents

I. Project Background.....	1
II. Description of the Current Process	3
III. Regulatory Compliance Assessment	6
IV. Proposed Phase I – Plant and SASS rehabilitation and replacement.....	8
V. Proposed SOC - NPDES Limits.....	9
Biochemical Oxygen Demand (BOD)	12
Total Suspended Solids (TSS)	12
Ammonia (NH ₃).....	12
Iron (Fe).....	13
Sanitary Sewer Overflow (SSO).....	13

Acronym List

BOD	Biochemical Oxygen Demand
CI	Cast Iron
Fe	Iron
GPM	Gallons per Minute
I&I	Inflow and Infiltration
MGD	Million Gallons per Day
NC DEQ	North Carolina Department of Environmental Quality
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
P/C	Physical / Chemical
SSO	Sanitary Sewer Overflow
TSS	Total Suspended Solids
WWTP	Wastewater Treatment Plant

I. Project Background

The Town currently owns and operates a 0.995 MGD wastewater treatment plant (Plant) that uses a physical-chemical process to settle solids and provide disinfection. The current NPDES permit is NC0025381. The Plant was originally constructed as a 0.350 MGD activated sludge plant in 1969. Prior to this, the wastewater was discharged directly into the Broad River. In 1991, the Plant was renovated and converted into a physical-chemical process (P/C) and was permitted for an annual average daily flow rate of 0.995 MGD. The plant continues to struggle to meet the NPDES permit limits during the winter and routinely fails to meet them in the summer months. The main cause of the issues with the Plant are the lake infiltration and inflow and infiltration from the connecting land-based collection systems. These flows are such that the wastewater is diluted to the extent that use of the activated sludge process is not possible, which was the driving force in converting to a physical-chemical plant. Unfortunately, the current treatment process is ineffective in meeting some of the parameters of the plant’s NPDES permit. The Plant has a legacy of frequent NPDES violations that is expected to continue unless changes are made to the Plant and collection system. The current P/C process was not designed to remove ammonia, as such the Plant will continue violate the NPDES ammonia limits. The plant is currently considered “noncompliant” by the NC DEQ, with the most frequently cited NOV’s being in regards to total suspended solids, ammonia, and flow.

The NPDES permit is a two tier permit. The tiers are based on the average annual daily flow of the previous year. The two tiers are based on a flow of 0.495 MGD and 0.995 MGD and are indicated in the tables below.

NPDES Permit

Effluent Characteristics	Limits		
	Monthly Average	Weekly Average	Daily Maximum
Flow	0.495 MGD		
BOD, 5-day	30.0 mg/L	45.0 mg/L	
Total Suspended Solids	30.0 mg/L	45.0 mg/L	
NH ₃ as N (April 1- October 31)	9.4 mg/L	28.2 mg/L	
NH ₃ as N (Nov 1 - March 31)	Monitor and Report		

NPDES Permit

Effluent Characteristics	Limits		
	Monthly Average	Weekly Average	Daily Maximum
Flow	0.995 MGD		
BOD, 5-day	30.0 mg/L	45.0 mg/L	
Total Suspended Solids	30.0 mg/L	45.0 mg/L	
NH ₃ as N (April 1- October 31)	5.2 mg/L	15.6 mg/L	
NH ₃ as N (Nov 1 - March 31)	Monitor and Report		

The Town also owns and maintains a sewer collection system, permit No. WQCS00131. The subaqueous sanitary system (SASS) was originally constructed simultaneously with the hydroelectric dam. It consisted of approximately fourteen miles of cast iron gravity sewer. The sewer lines were installed on concrete collars and on wooden cribbing. The cast iron pipe ranges in size from 8 inches to 18 inches. The flow enters the system through 65 manholes that are located along and/or within the lake perimeter. From these manholes, laterals run to the main line that was installed to the north of the pre-lake Broad River bed. The laterals range in diameter from 8 inches to 12 inches. The main line consists of 10 inch diameter to 18 inch diameter cast iron pipe. The locations of the manholes have been GPS verified, but the locations of the laterals and main line have been approximated. Much of the line is no longer visible due to silt and sediment, so its exact location is unknown. The SASS was originally equipped with flushing valves that allow lake water into the system. This flushing action is the primary means of avoiding solids deposition and the resulting blockages. The SASS was designed to have infiltration, however this infiltration is what causes the notice of violations (NOVs) and sanitary sewer overflows (SSOs) today. In 2009, a joint wrap project was undertaken which led to a noticeable reduction in the lake inflow. The joint wrap used has a service life of 15 years, and is approaching the end of its service life. From the available data, the lake inflow is beginning to increase as the pipe wrap and CI pipe age and degrade. The SASS also receives flow from outside users that maintain independent collection systems. Two of these systems are Rumbling Bald Resort and Chimney Rock Village. Both of these systems contribute 31,525 GPD and 34,836 GPD respectively. The system supplying Chimney Rock Village experiences high peaking factors due to I&I of 7.48. The peaking factors from Rumbling Bald are still being determined. The combination of lake infiltration in conjunction with the I&I of the connecting land based systems leads to the overwhelming of the headworks pumping station at the Plant and SSOs. Due to location and inaccessibility of the SASS, rehabilitation, pipe condition assessments, and repairs are very limited. In short, there is little the Town can do through typical operations and maintenance to reduce the flows that produce SSOs in the system.

II. Description of the Current Process

The physical-chemical process involves dosing the wastewater with alum to facilitate the settlement of the suspended solids. The 350,000 gallon existing aeration basin was converted into a sediment basin, where the floc is allowed to settle. The settled sludge is pumped into a holding tank and disposed of by land application. The disinfection is accomplished with the addition of an oxidizer, sodium hypochlorite. Excess chlorine residual is removed by sulfur dioxide. The sludge holding tank is only 50% utilized as a result of structural deficiencies that allow sludge to leak if completely filled. The table below demonstrates the detention time of the current process. For comparison, the current detention time requirement for a water plant sedimentation basin is 4 hours per the 10 States Standards, 2012 edition.

Current Treatment Process		
Design Flow	0.995	MGD
2019 AAF	0.5355	MGD
Tier 1 Flow	0.495	MGD
Volume of Basin	330000	Gal
Detention Time		
Design Flow	7.960	Hrs
2019 AAF	14.790	Hrs
Tier 1 Flow	16.000	Hrs

The DMR table below highlights the challenges faced by the Plant in meeting the NPDES permit limits. This is particularly acute for the ammonia limit as can be seen in the graph below. The Plant exceeded the monthly average ammonia limit twenty-two (22) times during the summer months from 2015 to 2019. The NPDES permit does not require influent sampling, as a result limited influent characteristics data is available. The information presented in this assessment is effluent data, with the exception of the flow data.

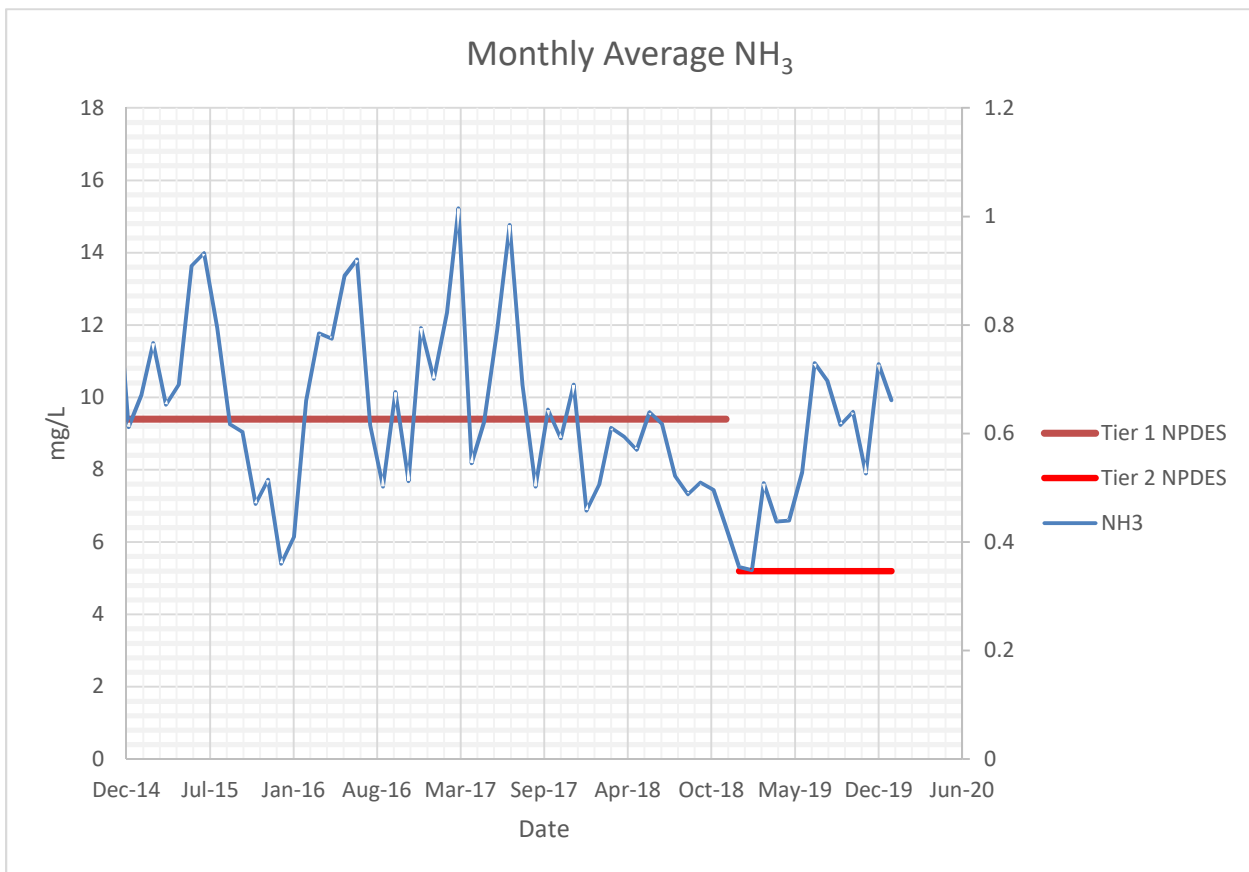
DMR Data (2015-2018)

Description	BOD		TSS		NH ₃ (Summer)	
	mg/L	Limit	mg/L	Limit	mg/L	Limit
Max Monthly	25.3	30	23.4	30	15.2	9.4
Average Monthly	11.3	30	22.0	30	10.2	9.4
Max Weekly	26.1	45	26.3	45	8.3	28.2
Average Weekly	7.2	45	26.2	45	2.9	28.2

DMR Data (2019)

Description	BOD		TSS		NH ₃ (Summer)	
	mg/L	Limit	mg/L	Limit	mg/L	Limit
Max Monthly	15.2	30	23.5	30	10.9	5.2
Average Monthly	7.9	30	21.3	30	8.8	5.2
Max Weekly	20	45	25.8	45	7.6	15.6
Average Weekly	14.4	45	25.8	45	3.0	15.6

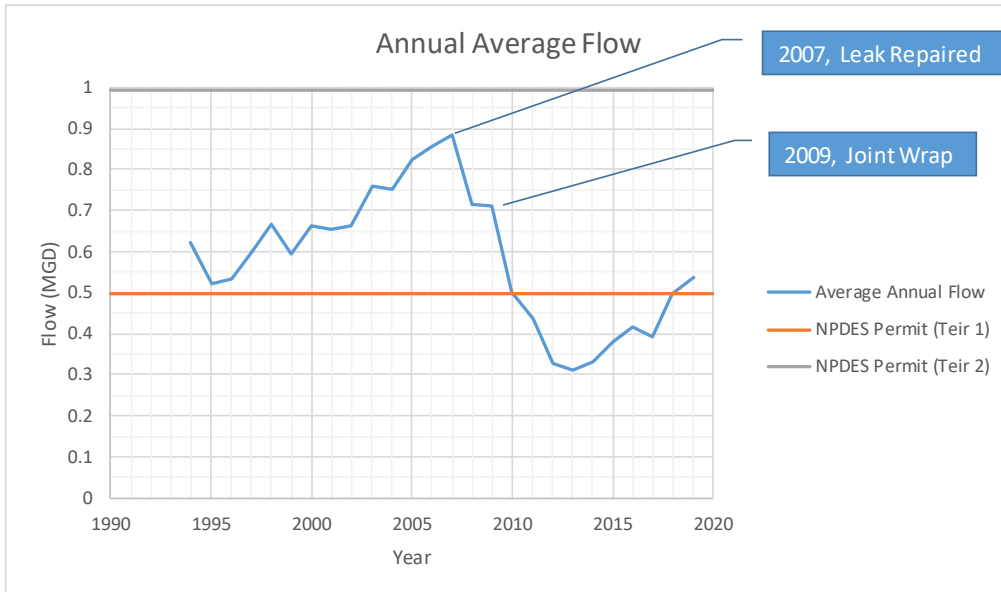
Occurred during monitor and report period



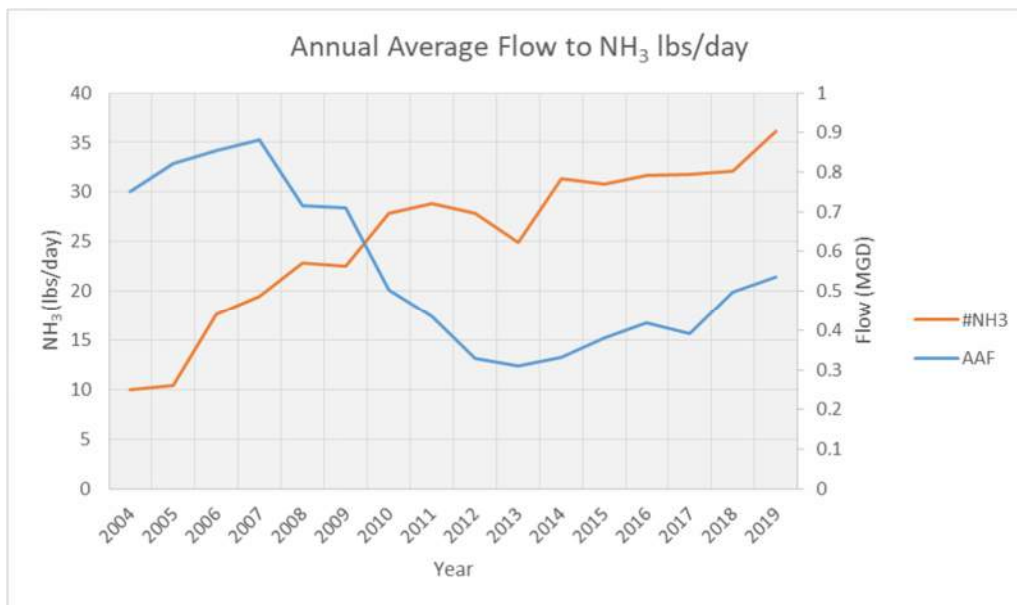
The Town has made changes in 2019 to the sludge handling by the addition of geotubes to thicken and dewater sludge. These have only been marginally effective due to the high moisture content of the sludge. The Town staff is investigating different methods of sludge handling to improve efficiency and reduce operational cost.

The peak flow rates in the SASS is predominately determined by the lake infiltration, pipe degradation, and I&I of connecting systems, such as Chimney Rock Village. This is shown in

the average annual flow from 1994 to 2019 in the chart below. Two repairs are shown that dramatically reduced the flow rate.



The chart below shows the average daily flow rate contrasted with the pounds per day of ammonia. The concentration of ammonia in a predominately residential wastewater stays fairly constant. The increase in pounds per day of ammonia is what would be expected given the general growth rate of the population of the sewer shed. Typically the amount of ammonia would correlate with changes in the flow rate, however in this case the change in daily ammonia content is independent of the change in average daily flow. This further confirms that the flow rate in the SASS is greatly influenced by lake infiltration and inflow and infiltration from the land based and connecting systems.



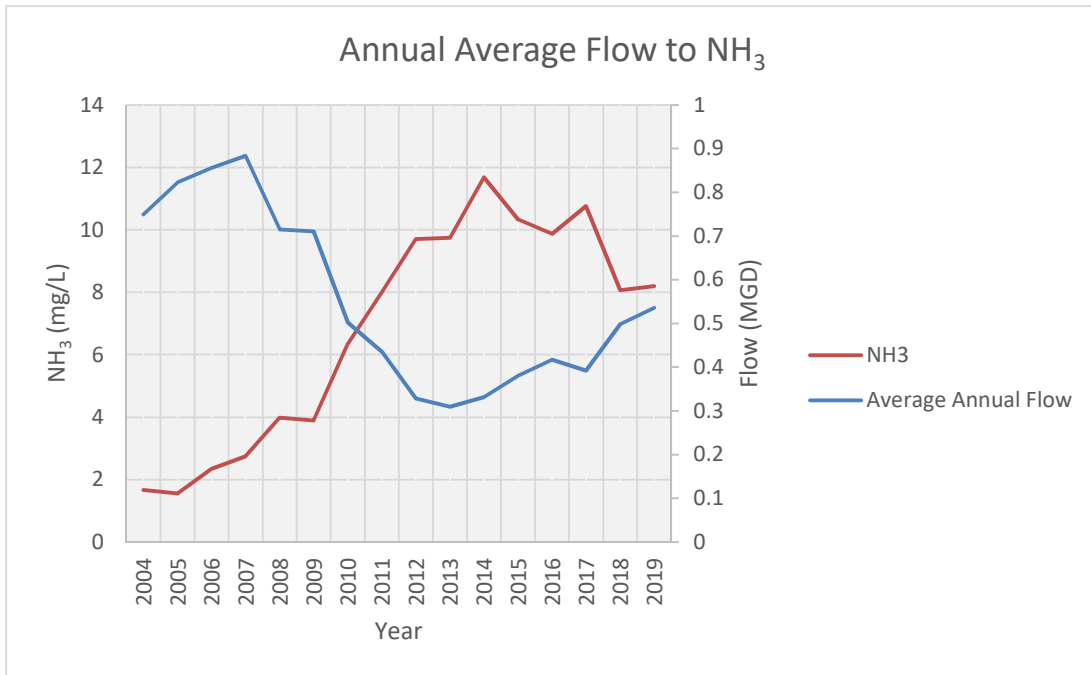
III. Regulatory Compliance Assessment

The Plant and SASS have a legacy of noncompliance that is a direct result of the lake infiltration and from the inflow and infiltration of connecting land-based sewer systems. This inflow and infiltration diluted the wastewater flow to the extent that biological treatment was not possible. In 1991, the plant was converted to a P/C process. This process can provide for BOD and TSS removal settling the suspended solids in the wastewater. The detention times for BOD and TSS removal are significantly shorter than that required for ammonia removal. The detention time shown in section II are generally sufficient for BOD and TSS removal. The detention time for ammonia removal is generally estimated at 5 to 7 days and require higher water temperature and additional dissolved oxygen¹. The table below demonstrates the flow capacity of the plant to remove ammonia. As the table indicates, the estimated design flow for ammonia removal would be 0.0471 MGD (47,100 GPD) or about 8.80% of the 2019 flow rate. Ammonia exists in wastewater in two forms, as a gas (NH₃) or as the ion ammonium (NH₄). The proportion of the two forms is pH dependent. Regardless of the form of ammonia, the current process is incapable of ammonia removal in any significant capacity. As a result, it would be expected that the vast majority of ammonia in the influent will exit in the effluent.

Ammonia Removal		
Detention Time	7	Days
Volume of Basin	330,000	Gal
Available Capacity	0.0471	MGD
Percent of 2019 AAF	8.80%	

The Town is currently undertaking steps with the ultimate goal of returning the plant to a biological process. A critical step in this task is removing the lake infiltration from the system. It is important to note that the lake infiltration is not the source of the ammonia, and only serves to dilute the ammonia. Consequently, as the Town reduces the infiltration, the ammonia concentration will increase. The chart below graphs the annual average flow vs. the annual average ammonia concentrations, and demonstrates this point. As the flow rate decreases the ammonia concentration increases and vice versa. In contrast when the concentration is normalized with the flow rates as pounds of ammonia per day in the chart above, this demonstrates that the amount of ammonia entering the system does not correlated with the observed flow rate.

¹ Nye, Joe “Addressing the Challenge of Removing Ammonia from Wastewater”, WaterWorld, March 2010, online



The expected increase in concentration as the flow decreases demonstrates the continued noncompliance with the NPDES permit. The Town must reduce the flow considerably in order to return to biological treatment. However, the current infrastructure and operation of the plant cannot be optimized or modified without additional processes or equipment to treat the ammonia. As such, the plant will continue to release effluent that is out of compliance with the NPDES permit limit until such time as the Plant undergoes a substantial rehabilitation or replacement.

The Town also has issues meeting the TSS limits. This is primarily due to the limited ability to process and store solids. The existing storage tank can only be filled approximately 50%, which eliminates the ability to thicken the sludge and decant. This reduces the ability of the Plant staff to transfer solids from the sedimentation basin and increases the cost and frequency of third-party solids removal. The solids removal issue reduces the Plant's capacity to settle BODs and TSS, and increases the risk of non-compliance, particularly during a high flow event. At the time of this writing, the sedimentation basin is in need of solids removal due to the availability of room in the sludge holding tank and the financial cost of disposal. The Town is in the process of awarding a contract to remove the solids accumulated in the Plant, and has tasked LaBella with investigating operational and process changes to more efficiently settle solids and address the sludge removal. Recent Influent sampling test have revealed that the Plant has much higher TSS than would be expected from a typical WWTP.

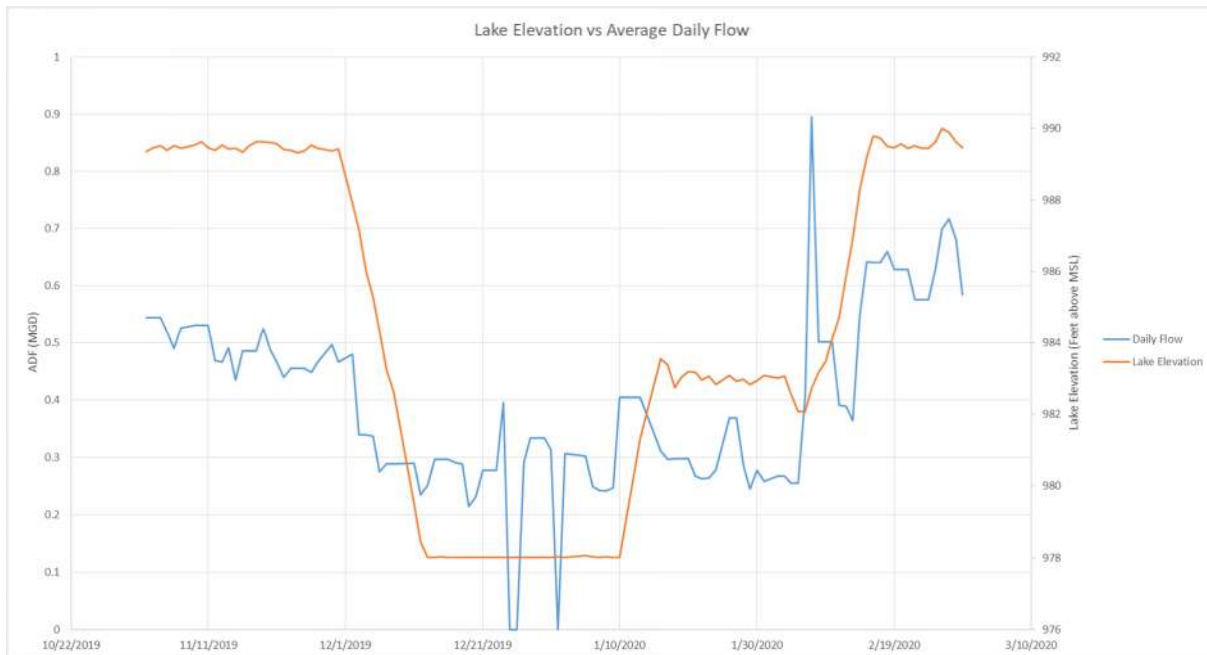
In addition to issues with the Plant, the Town also has regulatory compliance issues with the SASS. The primary infractions with the SASS are SSOs from lake infiltration and inflow and

infiltration and the risk of catastrophic failure. The Town has little ability to influence the flow factors that affect the SSOs. The Lake infiltration occurs at various elevations in lake from the surface to approximately 90' at the dam. The SASS is very inaccessible, which makes repairs and rehabilitation difficult to extremely difficult in the lower elevations and moderate to difficult in the higher elevations. In addition, the Town has limited ability to affect changes or improvements in the independent connecting land based systems. It is expected that the flow rate in SASS would continue to increase as connecting systems and SASS continue to age and degrade. If the flow rate in the SASS exceeds the headworks pumping station at the Plant, an SSO will occur. In this event, the only recourse to the Town is to monitor and report the SSO. As the collection system continues to deteriorate, it is expected that the potential for and magnitude of SSOs would increase.

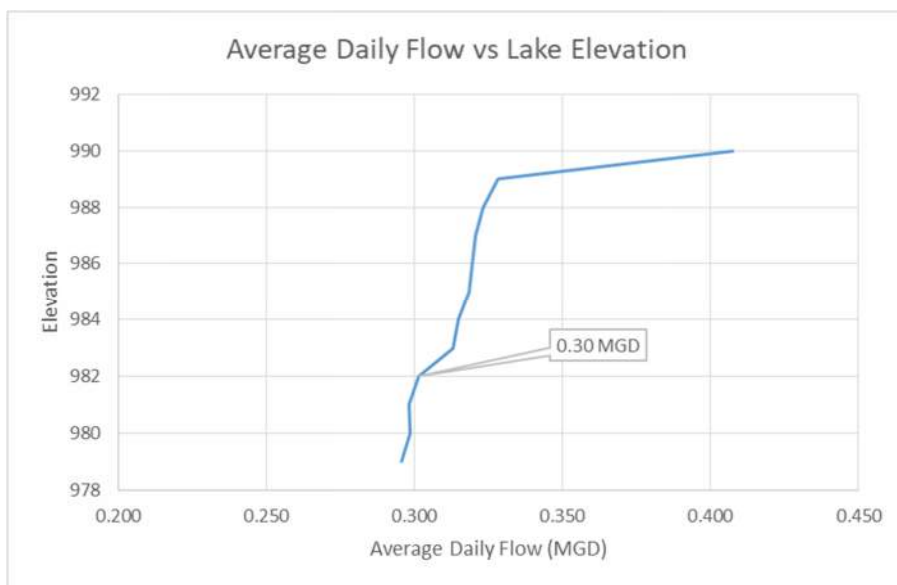
The remaining compliance issue is with catastrophic failure of the SASS. Catastrophic failure is defined as a pipe failure that results in a continuous and uncontrollable SSO. Due to the inaccessibility of the SASS, it is impossible to do a pipe condition assessment along the full extent of the line. While we are not able to determine when a condition like this may occur, it is highly probable that such a failure will occur at some point in the future. To mitigate this risk, the Town has installed a shut off valve on the sewer line at the dam which would allow for the flow from the SASS to be regulated to stop a continuous SSO. This is incorporated in the attached Emergency Action Plan (EAP), which layouts how to determine a catastrophic event and a sequence of actions to perform in the attempt to repair the SASS.

IV. Proposed Phase I – Plant and SASS rehabilitation and replacement

The Town is currently engaged in phased project that is intended to provide for the complete replacement and rehabilitation of the Plant and SASS. The ultimate goal is long-term regulatory compliance. The first phase of this plan is currently under development, but consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. The short-term solution is the current SOC application. During the time period of the SOC, the Town is intending to execute mid-term and long-term improvements. The mid-term improvements involve the rehabilitation of the existing manholes and improvements to the Plant. The long-term improvements are related to a partial replacement of the SASS. The mid-term improvements are intended to improve the operations of the Plant and to reduce the lake infiltration of the SASS. Based on historic flow levels during various in lake elevation, it is readily apparent that significant amount of lake infiltration occurs in the upper 12 feet of lake elevation. The following chart shows the lake elevation vs average daily flow rates during a period when the lake was lowered to its current lowest available elevation. To provide additional capacity against a catastrophic failure of the SASS, a sewer access valve will be installed at the base of the dam to allow for the draining of the lake reservoir. This functionality has been integrated into the ERP.



The graph below shows the average daily flow vs lake elevation and demonstrates the target flow reduction of the phase 1 project. This target is the dry weather average daily flow is 0.300 MGD.



V. Proposed SOC - NPDES Limits

The information presented thus far demonstrates that the current process is incapable of being operated in a manner that would comply with the NPDES limits. The Town is currently working toward the ultimate rehabilitation or replacement of the SASS and Plant. These projects are closely interrelated, so improvements to the SASS have a direct impact on the Plant.

The Historic Effluent DMR data is summarized on the table below, and further demonstrates the inability of the Plant to meet the NPDES limits.

Historic DMR Data (Jan/2004 - Jan/2020)

Description	BOD		TSS		NH ₃ (Summer)	
	mg/L	Limit	mg/L2	Limit	mg/L4	Limit
Max Daily	65.9	N/A	120	N/A	27.2	N/A
Average Daily	10.0	N/A	25.7	N/A	8.1	N/A
Max Weekly	52.1	45	26.3	45	22.3	28.2/15.6
Average Weekly	10.0	45	24.3	45	6.8	28.2/15.6
Max Monthly	32.4	30	26.3	30	17.1	9.4/5.2
Average Monthly	9.9	30	24.3	30	6.8	9.4/5.2

Until recently, composite influent test results were not available. The currently available influent and corresponding effluent limits are shown below, with the removal quantities.

Plant Composit Sampling										
Date	Influent (mg/L)			Effluent (mg/L)				Removal (mg/L)		
	BOD	TSS	NH ₃	BOD	TSS	NH ₃	Fe	BOD	TSS	NH ₃
4/21/2020	62	720	4.9	3.2	16	4.9		58.8	704	0
4/22/2020	47	220	5.4	3.2	18	5.7		43.8	202	-0.3
4/27/2020	76	360	5.3	3.2	29	5.9	11	72.8	331	-0.6
4/29/2020	54	300	4.9	3.4	23	5.5		50.6	277	-0.6
5/4/2020	80	350	4.6	4.4	13	4.9	0.078	75.6	337	-0.3
5/5/2020	24	50	4.4	4.4	20	4.4		19.6	30	0
5/19/2020	67	310	6.1	4.2	17	5.6		62.8	293	0.5
5/20/2020	38	260	3.4	3.4	19	3.7		34.6	241	-0.3
Average	56.00	321.25	4.88	3.68	19.38	5.08	5.54	52.33	301.88	-0.20

Sample consumed DO

The influent characteristics above were used to approximate the change in characteristics with reductions in lake infiltration. This was accomplished by using the average pounds per day of in each category and then calculating the concentration at various flow rates. The historic average removal efficiencies were used to estimate the effluent characteristics. These are shown in table and chart form below, and are the basis for the proposed SOC limits.

Estimated Average Monthly Characteristics

Flow MGD	Average Observed Removal			58%	50%	0%
	Influent (mg/L)			Effluent (mg/L)		
	BOD	TSS	NH3	BOD	TSS	NH3
0.10	358.78	2006.95	31.49	150.69	1003.47	31.49
0.15	239.18	1337.97	20.99	100.46	668.98	20.99
0.20	179.39	1003.47	15.75	75.34	501.74	15.75
0.25	143.51	802.78	12.60	60.27	401.39	12.60
0.30	119.59	668.98	10.50	50.23	334.49	10.50
0.35	102.51	573.41	9.00	43.05	286.71	9.00
0.40	89.69	501.74	7.87	37.67	250.87	7.87
0.45	79.73	445.99	7.00	33.49	222.99	7.00
0.50	71.76	401.39	6.30	30.14	200.69	6.30
0.55	65.23	364.90	5.73	27.40	182.45	5.73

Estimated Average Weekly Characteristics

Flow MGD	Average Observed Removal			58%	50%	0%
	Influent (mg/L)			Effluent (mg/L)		
	BOD	TSS	NH3	BOD	TSS	NH3
0.10	538.16	3010.42	47.24	226.03	1505.21	47.24
0.15	358.78	2006.95	31.49	150.69	1003.47	31.49
0.20	269.08	1505.21	23.62	113.01	752.61	23.62
0.25	215.27	1204.17	18.89	90.41	602.08	18.89
0.30	179.39	1003.47	15.75	75.34	501.74	15.75
0.35	153.76	860.12	13.50	64.58	430.06	13.50
0.40	134.54	752.61	11.81	56.51	376.30	11.81
0.45	119.59	668.98	10.50	50.23	334.49	10.50
0.50	107.63	602.08	9.45	45.21	301.04	9.45
0.55	97.85	547.35	8.59	41.10	273.67	8.59

The modified SOC limits represent what the Plant can be reasonable expected if operated at its maximum efficiency.

Biochemical Oxygen Demand (BOD)

The DMR data shows a high degree of variation in the Plant effluent BOD concentration. The Plant violated the monthly and weekly NPDES limits. This variation in BOD is reflective of the inefficiencies inherent in the Plant's current process. The proposed SOC limits for average monthly and weekly are 60.0 mg/L and 90.0 mg/L respectively, and are reflective of the Plant's ability to remove BOD based on historical data from 2004 to present.

Total Suspended Solids (TSS)

The DMR data shows a fairly consistently, but high level of TSS. The average influent TSS was 321 mg/L. The daily maximum TSS during this period was 720 mg/L, which demonstrates the potential for TSS related NOV's. This is particularly the case as the system ages and as the phase 1 project is undertaken. The proposed SOC limits for average monthly and weekly are 340 mg/L and 510 mg/L respectively.

Ammonia (NH₃)

The DMR data shows a high degree of variation in the Plant ammonia effluent concentration and an inverse relationship with the flow rate. The table below shows the limitedly available influent, effluent ammonia concentrations and the removal percentages. The data confirms that the plant does not remove ammonia. In fact, the solids handling issues at the plant are such that the removal percentages are negative. The Town is currently bidding a project to remove and alleviate this issue, however the process will continue to allow ammonia to "pass through" the Plant. The maximum monthly average in pounds per day measured 64.7 pounds and occurred in July 2014. The maximum weekly in pounds per day measured 81.4 pounds and occurred in July 2017. The daily maximum in pounds per day measured 116 pounds and occurred in August 2011. As the flow rates decrease, the concentration of ammonia will increase. Given that the current process cannot remove ammonia, the effluent concentrations increase accordingly. The high variation in ammonia concentrations, and the realization that improvements to the SASS will increase these concentrations, makes the estimation of the estimated ammonia concentrations speculative. As such, the Town is proposing the SOC limits for average monthly and weekly would be monitor and report for both the summer and winter limits during the SOC period.

Ammonia Concentrations

Date	Influent (mg/L)	Effluent (mg/L)	%- Removal
4/21/2020	4.9	4.9	0.0%
4/22/2020	5.4	5.7	-5.6%
4/27/2020	5.3	5.9	-11.3%
4/29/2020	4.9	5.5	-12.2%
5/4/2020	4.6	4.9	-6.5%
5/5/2020	4.4	4.4	0.0%
5/19/2020	6.1	5.6	8.2%
5/20/2020	3.4	3.7	-8.8%
Average	4.875	5.075	-4.53%

Iron (Fe)

The level of iron in the wastewater received by the Plant has long been a source of curiosity for the Town. In an effort to determine the source of the iron, we took samples from the Lake itself and determined by the iron content of the lake water was 0.387 mg/L on average. The historic average iron effluent is 30.03 mg/L, which is over 77 times the lake concentration. It is conclusive that the lake water and naturally occurring iron are not the primary source of the iron. Based on videos of the pipe condition, it is believed that the CI pipe itself is the source of the iron as it daily degrades. The full effect of iron on a potential biological process is still being investigated. The current NPDES requirements for iron is monitor and report. The Town would propose that this requirement would remain as part of the SOC.

Sanitary Sewer Overflow (SSO)

The Town is unable to consistently comply with the conditions set forth in Section I, paragraph 2 of permit WQCS00131 as it relates to SSOs corresponding to General Statutes 15A NCAC 02T.0108. The Town would propose to meet all the terms and conditions of the permit, except in relation to Section I, paragraph 2 mentioned above. The Town shall make every effort to prevent the discharge of wastewater to the ground or surface waters, and shall engage in a phased project to reduce the lake infiltration, to reduce the potential for and magnitude of an SSO.

The table below summarizes proposed modified SOC limits.

Proposed SOC Limits

Parameter	Units	Permit Limits		Modified Limits (SOC)	
		Mnthly Avg.	Weekly Avg.	Mnthly Avg.	Weekly Avg.
Biochemical Oxygen Demand (BOD)	mg/L	30.0	45.0	60.0	90.0
Total Suspended Solids (TSS)	mg/L	30.0	45.0	340	510
NH ₃ - N (April 1-Oct 31)	mg/L	9.4	28.2	Monitor & Report	
Fe	mg/L	Monitor & Report		Monitor & Report	

SUBAQUEOUS SANITARY SEWER

Type	Diameter	Material	Age	Sum of Length
Force Main	12	CI	51	200
Interceptor	10	CI	93	7,019
	12	CI	93	17,074
	16	CI	93	3,582
	18	CI	51	1,566
			93	5,472
laterals	4	CI	93	895
	8	CI	93	30,349
	10	CI	93	7,008
Grand Total				73,165

LAKE LURE EXISTING SANITARY SEWER

YEAR 2020

Type	Diameter	Material	Age	Length
Interceptor	18	CI	51	335
Interceptor	18	CI	51	690
Interceptor	18	CI	51	361
Force Main	12	CI	51	200
Interceptor	18	CI	51	180
Interceptor	18	CI	93	228
Interceptor	18	CI	93	557
Interceptor	18	CI	93	437
Interceptor	18	CI	93	4250
Interceptor	10	CI	93	2173
Interceptor	12	CI	93	1320
Interceptor	12	CI	93	2534
Interceptor	12	CI	93	4975
Interceptor	10	CI	93	4846
Interceptor	16	CI	93	3582
Interceptor	12	CI	93	8245
laterals	8	CI	93	147
laterals	8	CI	93	699
laterals	8	CI	93	454
laterals	8	CI	93	349
laterals	8	CI	93	472
laterals	8	CI	93	448
laterals	8	CI	93	221
laterals	8	CI	93	426
laterals	10	CI	93	1526
laterals	8	CI	93	212
laterals	8	CI	93	165
laterals	8	CI	93	315
laterals	8	CI	93	557
laterals	10	CI	93	1461
laterals	8	CI	93	131
laterals	8	CI	93	254
laterals	10	CI	93	1949
laterals	8	CI	93	405
laterals	8	CI	93	238
laterals	8	CI	93	1017
laterals	8	CI	93	669
laterals	8	CI	93	611
laterals	8	CI	93	410
laterals	4	CI	93	895
laterals	8	CI	93	531
laterals	8	CI	93	212

Type	Diameter	Material	Age	Length
laterals	8	CI	93	216
laterals	8	CI	93	274
laterals	8	CI	93	670
laterals	8	CI	93	395
laterals	8	CI	93	968
laterals	8	CI	93	199
laterals	8	CI	93	194
laterals	10	CI	93	824
laterals	8	CI	93	527
laterals	8	CI	93	485
laterals	8	CI	93	635
laterals	8	CI	93	637
laterals	8	CI	93	450
laterals	8	CI	93	229
laterals	8	CI	93	721
laterals	8	CI	93	428
laterals	8	CI	93	338
laterals	8	CI	93	191
laterals	8	CI	93	77
laterals	8	CI	93	85
laterals	8	CI	93	534
laterals	8	CI	93	198
laterals	8	CI	93	526
laterals	8	CI	93	332
laterals	8	CI	93	425
laterals	8	CI	93	254
laterals	8	CI	93	862
laterals	8	CI	93	275
laterals	8	CI	93	92
laterals	8	CI	93	118
laterals	8	CI	93	112
laterals	8	CI	93	2397
laterals	8	CI	93	372
laterals	8	CI	93	1111
laterals	8	CI	93	687
laterals	8	CI	93	289
laterals	8	CI	93	267
laterals	10	CI	93	1249
laterals	8	CI	93	695
laterals	8	CI	93	475
laterals	8	CI	93	402
laterals	8	CI	93	270
laterals	8	CI	93	220
laterals	8	CI	93	1249
laterals	8	CI	93	1526

APPENDIX C

Sanitary Sewer Overflow (SSOs) Information
Special Order of Consent (SOC) Application



Division of Water Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

PART I:

This form shall be submitted to the appropriate DWR Regional Office within five business days of the first knowledge of the sanitary sewer overflow (SSO).

Permit Number: WQCS00161 (WQCS# if active, otherwise use WQCS#)

Facility: Lake Lure Wastewater Collection System Incident #: 201190133 Owner: Town of Lake Lure

Region: Western City: Lake Lure County: Rutherford

Source of SSO (check applicable): [] Sanitary Sewer [x] Pump Station / Lift Station

SPECIFIC location of the SSO (be consistent in description from past reports or documentation - i.e. Pump Station 6, Manhole at Westall & Bragg Street, etc.): Primary Pump Station

Manhole #: NA

Latitude (degrees/minute/second): 32/25/33.27 Longitude (degrees/minute/second): 82/11/01.34

Incident Started Dt: 06/08/2019 Time: 06:00 PM Incident End Dt: 06/09/2019 Time: 06:00 PM
(mm-dd-yyyy) (hh:mm AM/PM) (mm-dd-yyyy) (h:mm AM/PM)

Estimated volume of the SSO: 119,000 gallons Estimated Duration (round to nearest hour): 5.5 hour(s)

Describe how the volume was determined: Flow Charts & Flow Averages

Weather conditions during the SSO event: Rain Storm

Did the SSO reach surface waters? [x] Yes [] No [] Unknown

Volume reaching surface waters: 119,000 gallons Surface water name: Broad River

Did the SSO result in a fish kill? [] Yes [x] No [] Unknown

If Yes, what is the estimated number of fish killed?

SPECIFIC cause(s) of the SSO:

- [] Severe Natural Conditions [] Grease [] Roots [] Inflow & Infiltration
[x] Pump Station Equipment Failure [] Power Outage [] Vandalism [] Debris in line

[] Pipe Failure (Break)

[] Other (Please explain in Part II)

24-hour verbal notification (name of person contacted): Tim Hiem

[x] DWR [] Emergency Management Date (mm-dd-yyy): 06/10/2019 Time: (hh:mm AM/PM): 10:39

AM

Per G.S. 143-215.1C(b), the owner or operator of any wastewater collection system shall:

In the event of a discharge of 1,000 gallons or more of untreated wastewater to the surface waters of the State, issue a press release to all print and electronic news media that provide general coverage in the county where the discharge occurred setting out the details of the discharge. The press release shall be issued within 24 hours after the owner or operator has determined that the discharge has reached surface waters of the State.

In the event of a discharge of 15,000 gallons or more of untreated wastewater to the surface waters of the State, publish a notice of the discharge in a newspaper having general circulation in the county in which the



Division of Water Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

discharge occurs and in each county downstream from the point of discharge that is significantly affected by the discharge. The Regional Office shall determine which counties are significantly affected by the discharge and shall approve the form and content of the notice and the newspapers in which the notice is published.

WHETHER OF NOT PART II IS COMPLETED, A SIGNATURE IS REQUIRED SEE PAGE 13

Form containing various fields and checkboxes for reporting sanitary sewer overflow events, including sections for event details, location, and reporting information.



Division of Water Resources

State of North Carolina
Department of Environment and Natural Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

In order to submit a claim for justification of an SSO, you must use Part II of form CS-SSO with additional documentation as necessary. DWR staff will review the justification claim and determine if enforcement action is appropriate.

PART II:

ANSWER THE FOLLOWING QUESTIONS FOR EACH RELATED CAUSE CHECKED IN PART I OF THIS FORM AND INCLUDE THE APPROPRIATE DOCUMENTATION AS REQUIRED OR DESIRED

COMPLETE ONLY THOSE SECTIONS PERTAINING TO THE CAUSE OF THE SSO AS CHECKED IN PART I

(In the check boxes below, NA = Not Applicable and NE = Not Evaluated)

A HARDCOPY OF THIS FORM SHOULD BE SUBMITTED TO THE APPROPRIATE DWR REGIONAL OFFICE UNLESS IS HAS BEEN SUBMITTED ELECTRONICALLY THROUGH THE ONLINE REPORTING SYSTEM



Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Severe Natural Conditions (hurricane, tornado, etc.)

Describe the "severe natural condition" in detail: NA

How much advance warning did you have and what actions were taken in preparation for the event?

Comments:



Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Grease (Documentation such as cleaning, inspection, enforcement actions, past overflow reports, educational material and distribution date, etc. should be available upon request.)

When was the last time this specific line (or wet well) was cleaned?

Do you have an enforceable grease ordinance that requires new or retrofit of grease traps/interceptors?

Yes No NA

NE

Have there been recent inspection and/or enforcement actions taken on near-by restaurants or other nonresidential grease contributors?

Yes No NA NE

Explain:

Have there been other SSOs or blockages in this areas that were also caused by grease

Yes No NA NE

When?

If yes, describe them:

Have cleaning and inspections ever been done at this location?

Yes No NA NE

Explain.

Have educational material about grease been distributed in the past?

Yes No NA NE

When:

and to whom:

Explain:

If the SSO occurred at a pump station, when was the wet well and pumps last checked for grease accumulation:

Were the floats clean?

Yes No NA NE

Comments:



Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Roots

NE Do you have an active root control program on the line / area in question? Yes No NA

Describe:

Have cleaning and inspections ever been increased at this location because of roots? Yes No NA NE

Explain:

What corrective actions have been accomplished at the SSO location (and surrounding system if associated with the SSO)?

What corrective actions are planned at the SSO location to reduce root intrusion?

Has the line been smoke tested or videoed within the past year? Yes No NA NE

If Yes, when?

Comments:



Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Main body of the reporting form containing various sections, checkboxes, and text input areas for data entry.



Inflow and Infiltration

NE Are you under an SOC (Special Order by Consent) or do you have a schedule Yes No NA
in any permit that addresses I/I?

Explain if Yes:

What corrective actions have been taken to reduce or eliminate I & I related overflows this spill location within the last year?

Has there been any flow studies to determine I/I problems in the collection system at the SSO location? Yes No NA NE

If Yes, when was the study completed and what actions did it recommend?

Has the line been smoke tested or videoed within the past year? Yes No NA NE

If Yes, when and what actions are necessary and the status of such actions:

Are there I/I related projects in your Capital Improvement Plan? Yes No NA NE

If Yes, explain:

NA NE Have there been any grant or loan applications for I/I reduction projects? Yes No

If Yes, explain:

Do you suspect any major sources of inflow or cross connections with storm sewers? Yes No NA NE

If Yes, explain:

NA NE Have all lines contacting surface waters in the SSO location and upstream been inspected recently? Yes No

If Yes, explain:

What other corrective actions are planned to prevent future I/I related SSOs at this location?

Comments:



Division of Water Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Pump Station Equipment Failure (Documentation of testing records, etc should be provided upon request)

What kind of notification/alarm systems are present?

- Auto-dialer/telemetry (one-way communication) [X] Yes
Audible [X] Yes
Visual [X] Yes
SCADA (two-way communication) [] Yes
Emergency Contact Signage [] Yes
Other [] Yes

If Yes, explain:

Describe the equipment that failed: Electric Service Power Phase Monitor due to nearby lighting strike

What kind of situations trigger an alarm condition at this station (i.e. pump failure, power failure, high water, etc.)?

Were notification/alarm systems operable? [] Yes [X] No [] NA [] NE

In no, explain: Pump Control Panel Power Outage due to Phase Monitor Failure

If a pump failed, when was the last maintenance and/or inspection performed? 06/07/2019

What specifically was checked/maintained? Pump Flows and Control System

If a valve failed, when was it last exercised?

Were all pumps set to alternate? [X] Yes [] No [] NA [] NE

Did any pump show above normal run times prior to and during the SSO event? [X] Yes [] No [] NA [] NE

Were adequate spare parts on hand to fix the equipment [X] Yes [] No [] NA [] NE

Was a spare or portable pump immediately available? [] Yes [X] No [] NA [] NE



Division of Water Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

If a float problem, when were the floats last tested? How?

If an auto-dialer or SCADA, when was the system last tested? How? 06/07/209

Comments:

Power outage (Documentation of testing, records, tec., should be provided of alternative power source upon request.)

What is your alternate power or pumping source?

Did it function property?

Yes No NA

NE

Describe?

When was the alternate power or pumping source last tested under load?

If caused by a weather event, how much advance warning did you have and what actions were taken to prepare for the event?

Comments:



Division of Water Resources

State of North Carolina
Department of Environment and Natural Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO



Vandalism

Provide police report number:

Was the site secured?

Yes No NA

NE

If Yes, how?

Have there been previous problems with vandalism at the SSO location?

If Yes, explain:

What security measures have been put in place to prevent similar

Yes No NA

NE

occurrences in the future?

Comments:



Division of Water Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Yes No Not Sure

Yes No Not Sure

Yes No Not Sure



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Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Debris in line (Rocks, sticks, rags and other items not allowed in the collection system, etc.)

What type of debris has been found in the line?

Suspected cause or source of debris:

Are manholes in the area secure and intact?

Yes No NA

NE

When was the area last checked/cleaned?

Have cleaning and inspections ever been increased at this location

Yes No NA

NE

due to previous problems with debris?

Explain:

Are appropriate educational materials being developed and distributed

Yes No NA

NE

to prevent future similar occurrences?

Comments:



Division of Water Resources

Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

Are there any sanitary sewer overflows (SSOs) occurring at this location?

If yes, please describe the SSO(s) in the following section.

Yes No

If yes, please describe the SSO(s) in the following section.

Are there any sanitary sewer overflows (SSOs) occurring at this location?

If yes, please describe the SSO(s) in the following section.

Yes No

If yes, please describe the SSO(s) in the following section.

Comments



Other (Pictures and police report, as applicable, must be available upon request.)

Describe:

Were adequate equipment and resources available to fix the problem? Yes No NA
 NE

If Yes, explain: Spare Parts Inventory

If the problem could not be immediately repaired, what actions Yes No NA
 NE
were taken to lessen the impact of the SSO?

Comments:



Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

1. Is the sewer line in the area of the overflow?

2. Is the sewer line in the area of the overflow?

3. Is the sewer line in the area of the overflow?

4. Is the sewer line in the area of the overflow?

5. Is the sewer line in the area of the overflow?

6. Is the sewer line in the area of the overflow?

7. Is the sewer line in the area of the overflow?

8. Is the sewer line in the area of the overflow?



Division of Water Resources

Division of Water Resources

Pipe Failure (Break)

Pipe size (inches)

What is the pipe material

What is the approximate age of the line/ pipe (years old)

Is this a gravity line?

Yes No NA

NE

Is this a force main line?

Yes No NA

NE

Is the line a "High Priority" line?

Yes No NA

NE

Last inspection date and findings

If a force main then,

Was the break on the force main vertical?

Yes No NA

NE

Was the break on the force main horizontal?

Yes No NA

NE

Was the leak at the joint due to gasket failure ?

Yes No NA

NE

Was the leak at the joint due to split bell?

Yes No NA

NE

When was the last inspection or test of the nearest air-release valve to determine if operable?

When was the last maintenance of the air release performed?

If gravity sewer then,

Does the line receive flow from a force main immediately upstream

Yes No NA

NE

of the failed section of pipe?

If yes, what measures are taken to control the hydrogen sulfide production?



Division of Water Resources

Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

When was the line last inspected or videoed?

If line collapsed, what is the condition of the line up and down stream of the failure?

What type of repair was made?

If temporary, when is the permanent repair planned?

Have there been other failures of this line in the past five years?

Yes No NA

NE

If so, then describe

All repairs made for the sanitary sewer overflow (SSO) must be reported to the local water utility.

Please submit this form to the local water utility.

Signature

Telephone Number

This form is provided as a service to the public. It is not intended to be used as a legal document. The Department of Environment and Natural Resources is not responsible for any errors or omissions in this form. The Department of Environment and Natural Resources is not responsible for any damages, including consequential damages, arising from the use of this form.



Collection System Sanitary Sewer Overflow Reporting Form
Form CS-SSO

System Visitation

ORC

Yes

Backup

Yes

Name: Donald Byers

Certification Number: 13128

Date visited: 6/10/2018

Time visited: 0820

How was the SSO remediated (i./e. Stopped and cleaned up)?

Replaced defective parts

As a representative for the responsible party, I certify that the information contained in this report is true and accurate to the best of my knowledge.

Person submitting claim: Shannon Baldwin

Date:

Signature: _____ Title:

Telephone Number:

Any additional information desired to be submitted should be sent to the appropriate Division Regional Office within five business days of first knowledge of the SSO with reference to the incident number (the incident number is only generated when electronic entry of this form is completed, if used).



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

LINDA CULPEPPER
Interim Director

January 04, 2018

Ron Nalley
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: **NOTICE OF DEFICIENCY**
Tracking Number: NOD-2018-DV-0002
Sanitary Sewer Overflow – December 2017
Collection System Permit No. WQCS00131
Town of Lake Lure Collection System
Rutherford County

Dear Permittee:

The self-reported Sanitary Sewer Overflow (SSO) 5-Day Report submitted by The Town of Lake Lure indicates a violation of permit conditions stipulated in the subject permit and North Carolina G.S. 143-215.1. Violations include failing to effectively manage, maintain, and operate the subject collection system so that there is no SSO to the land or surface waters and making an outlet to waters of the State for purposes of G.S. 143-215.1(a)(1), for which a permit is required.

Specific incident(s) cited in the subject report include the following:

Incident Number	Start Date	Duration (Mins)	Location	Cause	Total Vol (Gals)	Total Vol Surface Water (Gals)	DWR Action
201701711	12/05/2017	90	Larkin's on the Lake	Grease	250	250	Notice of Deficiency

Remedial actions, if not already implemented, should be taken to correct the above noncompliance.

If you have any questions, please do not hesitate to contact Mikal Willmer with the Water Quality Section in the Asheville Regional Office at 828-296-4500 or via email at mikal.willmer@ncdenr.gov.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

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Laserfiche

20180104_WQCS00131_NOD2018DV0002

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
S. DANIEL SMITH
Director



June 18, 2020

Shannon Baldwin, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: **NOTICE OF VIOLATION**
Tracking Number: NOV-2020-DV-0278
Sanitary Sewer Overflows - May 2020
Collection System Permit No. WQCS00131
Lake Lure Collection System
Rutherford County

Dear Permittee:

The self-reported Sanitary Sewer Overflow (SSO) 5-Day Report submitted by Town of Lake Lure indicates violations of permit conditions stipulated in the subject permit and North Carolina G.S. 143-215.1. Violations include failing to effectively manage, maintain, and operate the subject collection system so that there is no SSO to the land or surface waters and making an outlet to waters of the State for purposes of G.S. 143-215.1(a)(1), for which a permit is required.

Specific incident(s) cited in the subject report include the following:

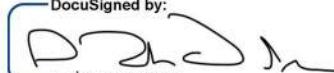
Incident Number	Start Date	Duration (Mins)	Location	Cause	Total Vol (Gals)	Total Vol Surface Water (Gals)	DWR Action
202001395	5/19/2020	45	Influent lift station below dam	Inflow and Infiltration	765	765	Notice of Violation



Remedial actions, if not already implemented, should be taken to correct the above noncompliance.

If you have any questions, please do not hesitate to contact Mikal Willmer with the Water Quality Section in the Asheville Regional Office at 828-296-4500 or via email at mikal.willmer@ncdenr.gov.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Ec: LF



ROY COOPER
Governor
 MICHAEL S. REGAN
Secretary
 S. DANIEL SMITH
Director



NORTH CAROLINA
Environmental Quality

March 23, 2020

Shannon Baldwin, Town Manager
 Town of Lake Lure
 PO Box 255
 Lake Lure, NC 28746

SUBJECT: **NOTICE OF VIOLATION**
Tracking Number: NOV-2020-DV-0095
 Sanitary Sewer Overflows - February 2020
 Collection System Permit No. WQCS00131
 Lake Lure Collection System
 Rutherford County

Dear Permittee:

The self-reported Sanitary Sewer Overflow (SSO) 5-Day Report submitted by Town of Lake Lure indicates violations of permit conditions stipulated in the subject permit and North Carolina G.S. 143-215.1. Violations include failing to effectively manage, maintain, and operate the subject collection system so that there is no SSO to the land or surface waters and making an outlet to waters of the State for purposes of G.S. 143-215.1(a)(1), for which a permit is required.

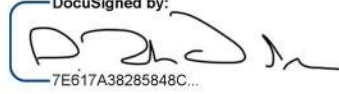
Specific incident(s) cited in the subject report include the following:

Incident Number	Start Date	Duration (Mins)	Location	Cause	Total Vol (Gals)	Total Vol Surface Water (Gals)	DWR Action
202000616	2/6/2020	120	Influent lift station below dam	Inflow and Infiltration, Severe Natural Condition	11,760	11,760	Notice of Violation



Remedial actions, if not already implemented, should be taken to correct the above noncompliance. If you have any questions, please do not hesitate to contact Mikal Willmer with the Water Quality Section in the Asheville Regional Office at 828-296-4500 or via email at mikal.willmer@ncdenr.gov.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

EC: LF, ARO-Server

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June 19, 2020

Division of Water Resources
NPDES Compliance & Expedited Permit Unit
1617 Mail Service Center
Raleigh, NC 27699-1317

SUBJECT: Lake Lure Special Order by Consent (SOC)

To whom it may concern:

The Town of Lake Lure, NC would like to enter an SOC with NC DEQ – DWR in regard to the effluents limits of the Lake Lure WWTP and collection system, NPDES Permit # NC0025381 and WQCS00131 respectively. This SOC would be a first step toward the goal of long-term NPDES compliance. Enclosed is one original and two copies of the SOC application. Please advise if you have any questions or need additional information.

Sincerely,

Maurice J. Walsh, P.E.
LaBella Associates, P.C.
Program Manager

**STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES**

APPLICATION FOR A SPECIAL ORDER BY CONSENT (SOC)

I. PERMIT RELATED INFORMATION:

1. Applicant (corporation, individual, or other): Town of Lake Lure
2. Print or Type Owner's or Signing Official's Name and Title:
Shannon Baldwin, Town Manager
3. Facility Name (as shown on Permit): Lake Lure Wastewater Treatment Plant
4. Owner Phone: (828) 625-9983 (or) _____
5. Owner Email: townmgr@townoflakelure.com
4. Application Date: June 19, 2020
5. NPDES Permit No. (if applicable): NC0025381
6. Name of the specific wastewater treatment facility (*if different from I.3. above*):

II. PRE-APPLICATION MEETING:

Prior to submitting this completed application form, applicants must meet with the appropriate regional office staff to discuss whether or not an SOC is appropriate for this situation. Please note the date this meeting occurred and who represented the permittee:

Representative: Shannon Baldwin, Town Manager Date: 2/12/2020.

III. ADDITIONAL FLOW OR FLOW REALLOCATION:

In accordance with NCGS 143-215.67(b), only facilities owned by a unit of government may request additional flow.

Additional flow may be allowed under an SOC only in specific circumstances. These circumstances may include eliminating discharges that are not compliant with an NPDES or Non-discharge permit. These circumstances do not include failure to perform proper maintenance of treatment systems, collection systems or disposal systems. When requesting additional flow, the facility must include its justification and supporting documentation.

If the requested additional flow is **non-domestic**, the facility must be able to demonstrate the ability to effectively treat the waste and dispose of residuals. The applicant must provide a detailed analysis of the constituents in the proposed non-domestic wastewater.

The total domestic additional flow requested: _____ 0 _____ gallons per day.

The total non-domestic additional flow requested: _____ 0 _____ gallons per day.

The total additional flow (*sum of the above*): _____ 0 _____ gallons per day.

Please attach a detailed description or project listing of the proposed allocation for additional flow, with an explanation of how flow quantities were estimated. Further, any additional flow requested must be justified by a complete analysis, by the permittee, that additional flow will not adversely impact wastewater collection/treatment facilities or surface waters.

IV. NECESSITY NARRATIVE:

Please attach a narrative providing a detailed explanation of the circumstances regarding the necessity of the proposed SOC. Include the following issues:

- Existing and/or unavoidable future violations(s) of permit conditions or limits(s),
- The existing treatment process and any process modifications that have been made to date to ensure optimum performance of existing facilities,
- Collection system rehabilitation work completed or scheduled (including dates),
- Coordination with industrial users regarding their discharges or pretreatment facilities. Identify any non-compliant significant industrial users and measure(s) proposed or already taken to bring the pretreatment facilities back into compliance. If any industrial facilities are currently under consent agreements, please attach these agreements,
- Date and outcome of last Industrial Waste Survey,
- Whether or not the facility is acting as a regional facility receiving wastewater from other municipalities having independent pretreatment programs.

V. CERTIFICATION:

The applicant must submit a report prepared by an independent professional with expertise in wastewater treatment. This report must address the following:

- An evaluation of existing treatment units, operational procedures and recommendations as to how the efficiencies of these facilities can be maximized. The person in charge of such evaluation must sign this document.
- A certification that these facilities could not be operated in a manner that would achieve compliance with final permit limits. The person making such determination must sign this certification.
- The effluent limits that the facility could be expected to meet if operated at their maximum efficiency during the term of the requested SOC (be sure to consider interim construction phases).
- Any other actions taken to correct problems prior to requesting the SOC.

VI. PREDICTED COMPLIANCE SCHEDULE:

The applicant must submit a detailed listing of activities along with time frames that are necessary to bring the facility into compliance. This schedule should include milestone dates for beginning construction, ending construction, and achieving final compliance at a minimum. In determining the milestone dates, the following should be considered:

- Time for submitting plans, specifications and appropriate engineering reports to DWR for review and approval.
- Occurrence of major construction activities that are likely to affect facility performance (units out of service, diversion of flows, etc.) to include a plan of action to minimize impacts to surface waters.
- Infiltration/Inflow work, if necessary.
- Industrial users achieving compliance with their pretreatment permits if applicable.
- Toxicity Reduction Evaluations (TRE), if necessary.

VII. FUNDING SOURCES IDENTIFICATION:

The applicant must list the sources of funds utilized to complete the work needed to bring the facility into compliance. Possible funding sources include but are not limited to loan commitments, bonds, letters of credit, block grants and cash reserves. The applicant must show that the funds are available, or can be secured in time to meet the schedule outlined as part of this application.

If funding is not available at the beginning of the SOC process, the permittee must submit a copy of all funding applications to ensure that all efforts are being made to secure such funds.

Note: A copy of the application should be sufficient to demonstrate timeliness unless regional office has reason to request all information associated with securing funding.

THE DIVISION OF WATER RESOURCES WILL NOT ACCEPT THIS APPLICATION PACKAGE UNLESS ALL OF THE APPLICABLE ITEMS ARE INCLUDED WITH THE SUBMITTAL.

Required Items:

- a. One original and two copies of the completed and appropriately executed application form, along with all required attachments.
 - If the SOC is for a City / Town, the person signing the SOC must be a ranking elected official or other duly authorized employee.
 - If the SOC is for a Corporation / Company / Industry / Other, the person signing the SOC must be a principal executive officer of at least the level of vice-president, or his duly authorized representative.
 - If the SOC is for a School District, the person signing the SOC must be the Superintendent of Schools or other duly authorized employee.

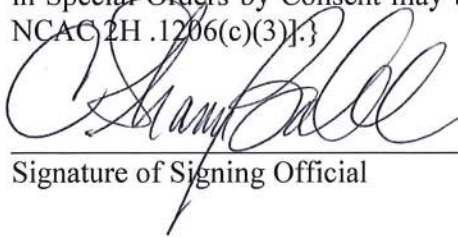
Note: Reference to signatory requirements in SOCs may be found in the North Carolina Administrative Code [T15A NCAC 2H .1206(a)(3)].

- b. The non-refundable Special Order by Consent (SOC) processing fee of \$400.00. A check must be made payable to The Department of Environment and Natural Resources.
- c. An evaluation report prepared by an independent consultant with expertise in wastewater. (in triplicate)

APPLICANT'S CERTIFICATION:

(NO MODIFICATION TO THIS CERTIFICATION IS ACCEPTABLE)

I, Shannon Baldwin, Town Manager, attest this application for a Special Order by Consent (SOC) has been reviewed by me and is accurate and complete to the best of my knowledge. I understand if all required parts of this application are not completed and if all required supporting information and attachments are not included, this application package may be returned as incomplete. *(Please be advised that the return of this application does not prevent DWR from collecting all outstanding penalties upon request).* **Furthermore, I attest by my signature that I fully understand that an upfront penalty, which may satisfy as a full settlement of outstanding violations, may be imposed.** {Note: Reference to upfront penalties in Special Orders by Consent may be found in the North Carolina Administrative Code [T15A NCAC 2H .1206(c)(3)].}



Date 06/19/2020

Signature of Signing Official

Shannon Baldwin

Printed Name of Signing Official

THE COMPLETED APPLICATION PACKAGE, INCLUDING THE ORIGINAL AND TWO COPIES OF ALL SUPPORTING INFORMATION AND MATERIALS, SHOULD BE SENT TO THE FOLLOWING ADDRESS:

NORTH CAROLINA DIVISION OF WATER RESOURCES
POINT SOURCE BRANCH
1617 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1617

IF THIS APPLICATION IS FOR A NON-DISCHARGE SYSTEM, THEN SEND TO:

NORTH CAROLINA DIVISION OF WATER QUALITY
AQUIFER PROTECTION SECTION
1636 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1636

Attachments

III. ADDITIONAL FLOW OR FLOW REALLOCATION:

No additional flow is requested.

IV. NECESSITY NARRATIVE:

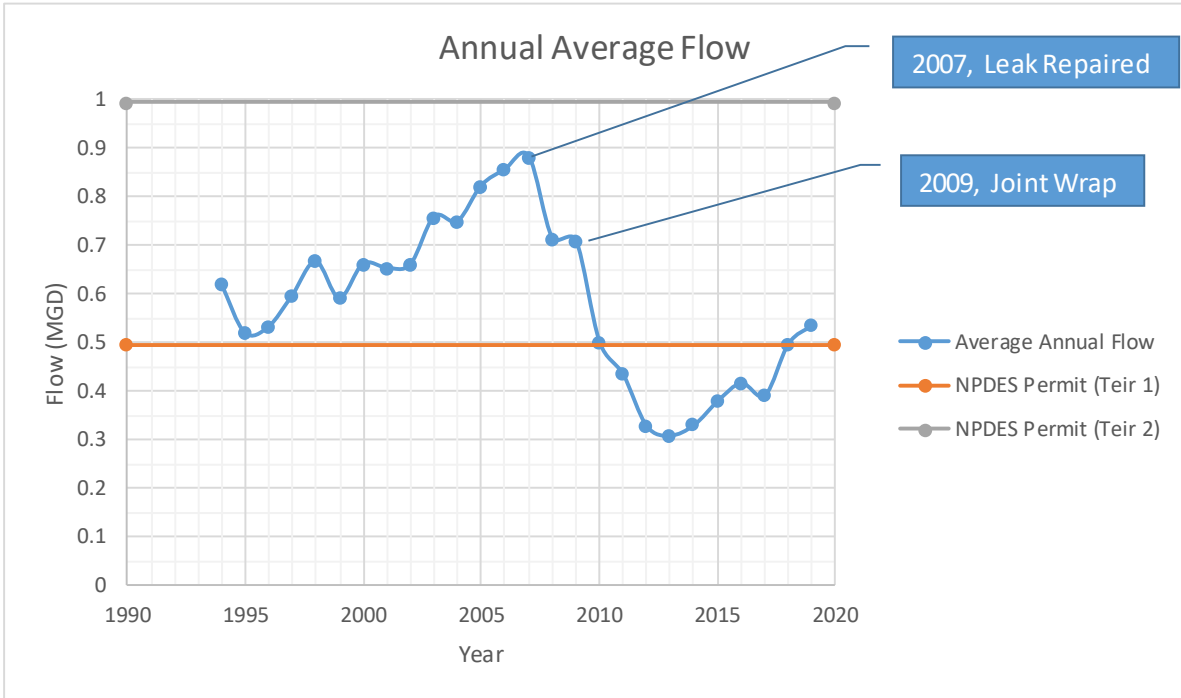
The Plant was originally constructed as a 0.350 MGD activated sludge plant in 1969. The subaqueous sanitary sewer (SASS) was constructed around 1926, prior to filling the lake. Before the construction of the Plant, the SASS discharged directly into the Broad River. In 1991, the Plant was renovated and converted into a physical-chemical process (P/C) and was permitted for an annual average daily flow rate of 0.995 MGD. In 2019, geotubes were installed to improve sludge handling, with marginal results. The plant continues to struggle to meet the NPDES permit limits during the winter and routinely fails to meet them in the summer months, particularly in the recently imposed ammonia limits. The root cause of the issues with the Plant are the lake infiltration. This flow enters the SASS at numerous points along its 14 mile length of submerged cast iron pipe, manholes, and private laterals. The flow is such that the wastewater is diluted to the extent that use of the activated sludge process is not possible and was the driving force in the conversion to a physical-chemical plant. In addition to the issues the infiltration creates with the Plant today, the already excessive infiltration is worsening as the pipe ages beyond its useful service life. NC DEQ's recognition of this, as well as the potential catastrophic consequences of a significant pipe failure resulted in their declaration of the SASS as noncompliant as well. Unfortunately, the current treatment process is ineffective in meeting some of the parameters of the plant's NPDES permit. The Plant has a legacy of frequent NPDES violations that is expected to continue unless changes are made to the Plant or collection system, or both. The current P/C process was not designed to remove ammonia, as such the Plant will continue violate the NPDES ammonia limits. The plant is currently considered "noncompliant" by the NC DEQ, with the most frequently cited NOV's being in regards to total suspended solids, ammonia, and flow. In addition, the operations of the Plant represents a considerable expenditure on Town's budget. This is only expected to increase due to the necessity of capital improvements and material and chemical cost increases. A summary of the plant history is provided below:

In addition to the residents of Lake Lure, the Town also serves several public and private collection systems. The magnitude of the flow received from these systems is described in the collection and treatment systems evaluation. There is currently not a pretreatment system on any of the connecting independent collection systems. The Town also does not have any industrial waste users, as such they have not completed an industrial waste survey.

The path forward is in the early stages of definition. The Town has taken certain steps related to the SASS. In 2007, the Town undertook a project to smoke test and video as much of the SASS as was accessible. A significant submerged joint leak was identified and repaired. In addition, a pipe wrap project was undertaken in 2009 to wrap the exposed joints in the SASS. The manufacturer recommended service life of the pipe wrap is 15 years. The effectiveness of these efforts is seen in the chart below, it should be noted that the graph also shows an upward trend after 2013. Also in 2019 while the lake was lowered twelve feet to accommodate penstock rehabilitation on the dam, the Town took the opportunity to have the exposed backshore area

topographically surveyed. As a risk mitigation measure, the Town installed a mainline valve on the gravity sewer below the dam, which would allow the stoppage of a catastrophic leak in the subaqueous main while repairs are made. The Town has installed a flow meter on the Rutherford county line serving Chimney Rock Village that is believed to contribute inflow and infiltration and to quantify those flow contributions. The Town has secured an SRF loan in the amount of \$12.5M to begin the replacement or rehabilitation of the SASS and Plant. To that end, the Town has engaged LaBella to develop the ER-EID to define the replacement alternative, scope, and schedule for achieving short-term, mid-term, and long-term NPDES compliance of both the Plant and the collection system. Prior to these efforts, the Town investigated a couple of alternatives which were determined to be either cost-prohibitive or otherwise infeasible. To investigate the best alternatives to consider, the Town commissioned a Technical Memorandum that lays out eleven alternatives for correction of the excessive infiltration issues and for each one, considers benefits and liabilities, identifies an order-of-magnitude cost and provides LaBella's recommendation as to whether to continue its evaluation or eliminate it from further consideration. These recommendations are summarized in the table on the following page, along with indication of which alternatives could accommodate a phased approach. Five alternatives are recommended for further consideration, which LaBella is proposing to develop as the next task in the Town's renewed effort to resolve this urgent infrastructure issue. A summary of the SASS history is below:

- 1926 - Initial Construction
- 1927 - Submerged following Dam construction
- 1969 – Initial Construction as a 0.350 MGD activated sludge plant
- 1991 – Conversion to a 0.995 MGD PC process
- 1991-2006 – Sand filter bypassed due to I&I
- 2007 – Town entered into an SOC
- 2007 – CCTV, smoke testing, joint repair project
- 2008 – Plant upgrade including screen, sludge removal, sampling, chemical feed and other improvements.
- 2009 – Pipe wrap project - \$3M (grant funded)
- 2009 – NPDES permit issued with more stringent limits and additional testing
- 2019 – Installation of geotubes for sludge management
- 2019 – Geotechnical exploration & report - \$35K
- 2019 – Installation of emergency access valve



When the lake infiltration issue is resolved, the Plant compliance issue will become more readily (technically) solvable, and so the timing of the Plant solution will depend on the progress of the collection system resolution. As the SASS replacement progresses, the lake infiltration will be reduced and the concentration of the wastewater will increase. This increase is necessary to achieve biological treatment, however it will cause issues with effluent compliance until biological treatment can begin. Timing and other particulars of the Plant solution (e.g., rehabilitation or replacement, facility location, process selection) will be identified in coordination with the selection of a collection system alternative. As a short-term compliance measure, the Town is applying for a Special Order by Consent (SOC) with NC DEQ to prevent additional NOV's and fines.

Subaqueous Sanitary Sewer Alternatives

Alternative	Cost Order of Magnitude	Phase-able	Consider Further
S1 - Do Nothing	n/a		
S2 - Land-based Low Pressure Sewer System	\$50M - \$65M	✓	
S3 - Backshore Low Pressure Sewer System	\$30M - \$40M	✓	✓
S4 - Backshore Series Pump Station System	\$30M - \$40M	✓	✓
S5 - Backshore HDPE Gravity System	\$25M - \$35M	✓	
S6 - Backshore HDPE Gravity / Lift Station System	\$30M - \$40M	✓	✓
S7 - Subaqueous Accessible Manholes	\$20M - \$30M	✓	✓
S8 - Tethered Buoyant HDPE System	\$40M - \$50M		
S9 - Submerged HDPE System	Not Established		
S10 - Drain and Replace Approach (if Dam renovation drains lake)	Not Established		
S11 - Repair & Rehabilitate Perimeter Manholes (partial solution)	\$1M - \$3M	✓	✓

V. CERTIFICATION:

The Collection and Treatment System Evaluation
can be found in Appendix B

VI. PREDICTED COMPLIANCE SCHEDULE:

The Table below establishes a number of milestones and completion dates. These milestones will need to be completed as part of the process to achieve long-term NPDES compliance. However, these steps alone will not achieve long-term compliance. The steps below are attempting to achieve short and mid-term compliance in a multiphase, multiple year project. This phasing is due to the realities of the complexity of the infrastructure issues and financial cost of the improvements compared with the financial abilities of the Town. These steps are a large part of the process, with the remaining step following as funding becomes available.

SOC Compliance Schedule	
Milestones	Completion Date
Issue Request for Qualifications for On-Call Services	11/4/2019
Interview Qualified Firms	1/7/2020
Award On-Call Services	1/14/2020
Present Technical Memo to NC DEQ, UAB, and Town Council	1/29/2020
Pre-application Meeting	2/12/2020
Install meter to monitor ADF and I&I from Rutherford County line serving CRV	4/15/2020
Develop a lake infiltration model	6/26/2020
Collect composite influent samples at WWTP	7/3/2020
Present flow, I&I, and composite effluent findings to DWR	7/10/2020
Complete AIA grant application	9/30/2020
Complete Phase 1 design	3/1/2021
Phase 1 Permitting	5/1/2021
Complete Phase 1 Construction	4/30/2022

VII. FUNDING SOURCES IDENTIFICATION:

- The Town is currently preapproved for a \$12.5 million CWSRF loan, and is in the process of completing the ER-EID necessary to finalize the funding. A copy of the intent to fund is attached.
- The Town will apply for an AIA grant from the State of North Carolina. These grants are up to \$150K and allow for the inventory and condition assessment of existing assets.
- The Town has increased utility rates and is evaluating future rate increases to fund debt service, consulting, and other cost related to capital improvement projects.



PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

KIM H. COLSON

Director

August 1, 2016

Mr. Ron Nalley, Manager
Town of Lake Lure
P.O. Box 255
Lake Lure, NC 28746

SUBJECT: Clean Water State Revolving Fund
Letter of Intent to Fund
Greenline
April 2016 Application Cycle
Project No. CS370489-05

Dear Mr. Karr:

The Division of Water Infrastructure has reviewed your application to the Clean Water State Revolving Fund (CWSRF) program, and the State Water Infrastructure Authority has approved your project as eligible to receive a low-interest loan. The total loan amount will be \$12,580,261. \$500,000 of the total loan will be in the form of principal forgiveness and the balance will have a maximum interest rate of 0%. A loan fee of 2% will be invoiced after bids have been received.

Please note that this intent to fund is contingent on approval of the loan through the Local Government Commission and on meeting **all** of the following milestones:

<u>Milestone</u>	<u>Date</u>
Engineering Report Submittal	December 1, 2016
Engineering Report Approval	May 1, 2017
Bid and Design Package Submittal	November 1, 2017
Bid and Design Package Approval	March 1, 2018
Advertise Project, Receive Bids, Submit Bid Information, <u>and</u> Receive Authority To Award	July 2, 2018
Execute Construction Contract(s)	August 1, 2018

The first milestone is the submittal of an Engineering Report by close of business on December 1, 2016. The Engineering Report must be developed using the updated guidance found on our website (<http://portal.ncdenr.org/web/wi/home>). **Failure to meet any milestone may result in the forfeiture of funding for the proposed project.**



Mr. Ron Nalley, Manager
August 1, 2016
Page 2 of 2

Upon detailed review of the project during the funding process, it may be determined that portions of your project are not eligible for funding and the total loan amount may be reduced. Additionally, changes in the scope or priority points awarded – based on additional information that becomes apparent during project review – may also result in changes to the total loan amount and loan terms.

Davis-Bacon Requirements and American Iron and Steel Provisions

Projects funded through the CWSRF program must comply with Davis-Bacon wage requirements and American Iron and Steel provisions. You can find standard specifications covering these requirements on our website.

General Assembly Notification Requirements

In accordance with G.S. 120-157.1 through 157.9, enacted on June 24, 2011, local government units with projects that require debt to be issued greater than \$1,000,000 **must** submit a letter to Committee Chairs, Committee Assistant, and the Fiscal Research Division of the General Assembly at least 45 days prior to presentation before the Local Government Commission. You are responsible for submitting this letter and providing a copy to the Division of Water Infrastructure upon receipt of this approval letter.

Brooks Act Compliance

Projects funded through the CWSRF program must comply with the federal Brooks Act for the selection of architectural and engineering services. CWSRF projects cannot be exempted from qualification based selection of these services under N.C.G.S. 143-64.32. The attached form will need to be submitted as documentation of compliance for any services to be reimbursed. Any services provided that were not selected in compliance with federal requirements will be ineligible for reimbursement.

If you have questions, please contact Seth Robertson, PE, Chief, State Revolving Fund Section at 919-707-9175.

Sincerely,



Kim H. Colson, P.E.

Attachment: PESP 4/11/16

CC: Harlow L. Brown, PE, Brown Consultants
Anita E. Reed, PE
Mark Hubbard, PE
SRF File



VIII. EMERGENCY RESPONSE PLAN



Collection System Emergency Response Plan

June 2020

Maurice J. Walsh, P.E.

Table of Contents

I. Emergency Contacts	1
II. Emergency Alerting List	2
III. Purpose	2
IV. Situation and Assumptions	2
V. ERP Sequence of Actions	2
Suggested Emergency Preparedness Actions.....	3
Sequence of ERP Events.....	3

I. Emergency Contacts

<u>Name</u>	<u>Organization</u>	<u>Phone Number</u>
Shannon Baldwin, City Mangager	Lake Lure	(828)625-9983
David Arrowood , PWD	Lake Lure	(828) 748-0550
Scott Bidy, Sewer Dpt. Sup.	Lake Lure	(828) 429-7415
Dean Lindsey, Dam/Hydro Dir.	Lake Lure	(828) 772-6134
Dustin Wacaster, Fire Chief	Lake Lure	(828) 442-4727

II. Emergency Alerting List

<u>Name</u>	<u>Organization</u>	<u>Phone Number</u>
Tim Heim, Env. Eng.	DWR – Asheville RO	(828) 989-7586
Mikal Willmer, Env. Sp. II	DWR – Asheville RO	(828) 989-7675

III. Purpose

This emergency response plan (ERP) has been developed to provide procedures for the Town of Lake Lure (Town) to respond to a catastrophic failure of the subaqueous sewer system (SASS) that results in a continuous and uncontrollable sanitary sewer overflow (SSO).

IV. Situation and Assumptions

The SASS consists of approximately 14 miles of cast iron pipe installed in the late 1920's, and placed adjacent to the broad river prior and then submerged as the lake was filled. The SASS is prone to lake infiltration, has undergone numerous repair projects, and a majority of the SASS is of an unknown condition. It is assumed that a failure in part of the line would result in a sustained flow that would present as an SSO at the headworks pumping station. This failure, if left unattended, would drain the lake above the failure and cause immediate economic, environmental, and social impact to both the Town of Lake Lure and the surrounding area.

V. ERP Sequence of Actions

The Town of Lake Lure staff and elected officials have primary responsibility for the SASS, and for maintaining, repairing, and reporting its condition to the related stake holders.

Suggested Emergency Preparedness Actions

- Interview and select a diving contractor with the relevant experience who could respond as quickly as possible to potential SASS failure and assist in the location and repair of said failure.
 - The emergency contact information for two or more representatives should be added to the emergency contact list.
- Lake Lure should procure and store the necessary repair materials that may reasonably be used to repair a SASS failure.
 - These should be stored in a known location and readily accessible to Town staff.
- Lake Lure should hold a training session annually with the Town staff over how to respond to a SASS failure.
- Until the completion of the SASS replacement, the Town of Lake Lure should include an ERP briefing in a public commissioners meeting on an annual basis.
- Lake Lure should investigate the best method for providing an emergency announcement to the Lake Lure community in the event of an SASS failure.
-

Sequence of ERP Events

- Upon the discovery of an SSO, Town staff shall respond to the head works pump station and assess the magnitude of the SSO event.
- Town staff should evaluate the operation of the pump station to determine if the SSO is the result of pumping failure or overwhelming flow from the SASS.
- In the event of pumping failure, the Town should take what actions are necessary to return the pump station to normal operations.
- If the pump station is fully operational, the Town staff shall assess the cause of the excess flow, such as I&I from a rain event.
- Town staff should begin the SSO notification process that includes DWI – Asheville RO, Town Manager, and other elected officials.
- Town staff shall visually inspect the connection points with contributing systems such as Rumbling Bald and the County line serving Chimney Rock Village to determine if the SSO is a result of a failure in a connecting system.
- If the magnitude and duration of the SSO is such that it is continuous and uncontrolled, the Town shall begin the notification process of the individuals listed in Sections I and II.

- The Town shall begin the lake drawdown process subject to the established requirements and conditions until that lake level is reduced to its lowest level or the SSO stops, which ever come first.
- The Town shall notify the public of a potential SASS failure and shall restrict access to Lake Lure for staff, contractors, consultants, and related regulatory staff.
- The Town shall execute the closing procedures of the emergency shutoff valve to reduce the flow until the SSO is eliminated.
- The selected diving contractor/s shall be mobilized to begin searching for the leak.
- The Town shall throttle the emergency shut-off valve the extent that the subsequent flow and sound may be utilized in the search for the failure.
 - The flow rate shall not exceed the headworks pumping capacity.
 - This process shall take place with close coordination of applicable.
 - The emergency shut-off valve shall be continuously staffed when it is not fully closed for the duration of the failure event.
- ¹The Town shall activate the Sewer Access Valve and begin the lake drawdown process subject to the established requirements and conditions until that lake level is reduced to its lowest level or the SSO stops, which ever come first.
- Once the failure is located, the pipe shall be repaired, and the location documented.
 - If possible a coupon of the pipe shall be taken for further analysis.
 - The repair should be documented with video and/or photographs.
- The emergency access valve shall be opened slowly to drain the SASS and verify the failure event is suspended.
- Once the failure event has been resolved, the Town shall notify the public and emergency contacts that the situation is resolved.
- The Town shall restore the lake levels to normal and open the lake to normal operations

¹ The Sewer Access Valve is a proposed capability

APPENDIX D

Metered Flow Data

- WWTP
- Rumbling Bald Resort
- Chimney Rock Village

WWTP Average Daily Flows
Seasonal Peaking Factor

WWTP Metered Daily Flow Rates

Date	Eff. Flow (MGD)
1/1/2016	0.5356
1/2/2016	0.4846
1/3/2016	0.5356
1/4/2016	0.3527
1/5/2016	0.4509
1/6/2016	0.4115
1/7/2016	0.4006
1/8/2016	0.3881
1/9/2016	0.4615
1/10/2016	0.456
1/11/2016	0.3056
1/12/2016	0.3717
1/13/2016	0.3821
1/14/2016	0.4829
1/15/2016	0.3815
1/16/2016	0.6419
1/17/2016	0.6827
1/18/2016	0.3885
1/19/2016	0.5742
1/20/2016	0.4934
1/21/2016	0.3401
1/22/2016	0.3672
1/23/2016	0.3117
1/24/2016	0.3217
1/25/2016	0.3905
1/26/2016	0.4302
1/27/2016	0.3905
1/28/2016	0.4302
1/29/2016	0.4426
1/30/2016	0.4504
1/31/2016	0.5508
2/1/2016	0.3622
2/2/2016	0.5002
2/3/2016	0.4878
2/4/2016	0.7298
2/5/2016	0.4924
2/6/2016	0.4608
2/7/2016	0.3729
2/8/2016	0.3729

Date	Eff. Flow (MGD)
2/9/2016	0.4216
2/10/2016	0.3522
2/11/2016	0.3229
2/12/2016	0.3891
2/13/2016	0.3508
2/14/2016	0.3874
2/15/2016	0.2276
2/16/2016	0.3343
2/17/2016	0.3299
2/18/2016	0.3288
2/19/2016	0.319
2/20/2016	0.357
2/21/2016	0.3209
2/22/2016	0.3136
2/23/2016	0.342
2/24/2016	0.4692
2/25/2016	0.3991
2/26/2016	0.3529
2/27/2016	0.3521
2/28/2016	0.3259
2/29/2016	0.3012
3/1/2016	0.4653
3/2/2016	0.3463
3/3/2016	0.311
3/4/2016	0.3839
3/5/2016	0.3927
3/6/2016	0.3119
3/7/2016	0.3716
3/8/2016	0.3775
3/9/2016	0.3222
3/10/2016	0.3581
3/11/2016	0.3235
3/12/2016	0.0808
3/13/2016	0.4012
3/14/2016	0.236
3/15/2016	0.3265
3/16/2016	0.3291
3/17/2016	0.3606
3/18/2016	0.2752

Date	Eff. Flow (MGD)
3/19/2016	0.3279
3/20/2016	0.3429
3/21/2016	0.2782
3/22/2016	0.3079
3/23/2016	0.3021
3/24/2016	0.3008
3/25/2016	0.3509
3/26/2016	0.3284
3/27/2016	0.4392
3/28/2016	0.2404
3/29/2016	0.3088
3/30/2016	0.3088
3/31/2016	0.3711
4/1/2016	0.4536
4/2/2016	0.3682
4/3/2016	0.3716
4/4/2016	0.2673
4/5/2016	0.3409
4/6/2016	0.3164
4/7/2016	0.3737
4/8/2016	0.3296
4/9/2016	0.362
4/10/2016	0.2356
4/11/2016	0.3111
4/12/2016	0.3239
4/13/2016	0.318
4/14/2016	0.2964
4/15/2016	0.2413
4/16/2016	0.3972
4/17/2016	0.3967
4/18/2016	0.2419
4/19/2016	0.3694
4/20/2016	0.3579
4/21/2016	0.3219
4/22/2016	0.3902
4/23/2016	0.4354
4/24/2016	0.1992
4/25/2016	0.3269
4/26/2016	0.3269

Date	Eff. Flow (MGD)
4/27/2016	0.3059
4/28/2016	0.4284
4/29/2016	0.302
4/30/2016	0.4469
5/1/2016	0.4464
5/2/2016	0.2948
5/3/2016	0.344
5/4/2016	0.3505
5/5/2016	0.3111
5/6/2016	0.3117
5/7/2016	0.3407
5/8/2016	0.4026
5/9/2016	0.2422
5/10/2016	0.3965
5/11/2016	0.3633
5/12/2016	0.3807
5/13/2016	0.3237
5/14/2016	0.3324
5/15/2016	0.4198
5/16/2016	0.3051
5/17/2016	0.3986
5/18/2016	0.4013
5/19/2016	0.3712
5/20/2016	0.3712
5/21/2016	0.5122
5/22/2016	0.4317
5/23/2016	0.2856
5/24/2016	0.3878
5/25/2016	0.3781
5/26/2016	0.3888
5/27/2016	0.4456
5/28/2016	0.4367
5/29/2016	0.5959
5/30/2016	0.3972
5/31/2016	0.3928
6/1/2016	0.4327
6/2/2016	0.3985
6/3/2016	0.4401
6/4/2016	0.4053

Date	Eff. Flow (MGD)
6/5/2016	0.5795
6/6/2016	0.3212
6/7/2016	0.4447
6/8/2016	0.4531
6/9/2016	0.4145
6/10/2016	0.4331
6/11/2016	0.6042
6/12/2016	0.4036
6/13/2016	0.3456
6/14/2016	0.4112
6/15/2016	0.4445
6/16/2016	0.4789
6/17/2016	0.4412
6/18/2016	0.5078
6/19/2016	0.638
6/20/2016	0.3768
6/21/2016	0.5071
6/22/2016	0.4956
6/23/2016	0.6331
6/24/2016	0.4625
6/25/2016	0.6311
6/26/2016	0.5092
6/27/2016	0.4972
6/28/2016	0.5219
6/29/2016	0.5492
6/30/2016	0.5112
7/1/2016	0.5923
7/2/2016	0.6006
7/3/2016	0.6772
7/4/2016	0.6402
7/5/2016	0.5738
7/6/2016	0.6154
7/7/2016	0.5644
7/8/2016	0.5319
7/9/2016	0.6054
7/10/2016	0.5396
7/11/2016	0.4253
7/12/2016	0.5948
7/13/2016	0.5499

Date	Eff. Flow (MGD)
7/14/2016	0.5478
7/15/2016	0.5852
7/16/2016	0.7508
7/17/2016	0.5141
7/18/2016	0.348
7/19/2016	0.5853
7/20/2016	0.5624
7/21/2016	0.52
7/22/2016	0.5148
7/23/2016	0.5584
7/24/2016	0.6848
7/25/2016	0.3761
7/26/2016	0.5017
7/27/2016	0.5209
7/28/2016	0.6003
7/29/2016	0.4722
7/30/2016	0.6415
7/31/2016	0.5954
8/1/2016	0.521
8/2/2016	0.566
8/3/2016	0.554
8/4/2016	0.569
8/5/2016	0.711
8/6/2016	0.511
8/7/2016	0.551
8/8/2016	0.464
8/9/2016	0.443
8/10/2016	0.552
8/11/2016	0.567
8/12/2016	0.724
8/13/2016	0.611
8/14/2016	0.574
8/15/2016	0.511
8/16/2016	0.448
8/17/2016	0.513
8/18/2016	0.514
8/19/2016	0.532
8/20/2016	0.583
8/21/2016	0.749

Date	Eff. Flow (MGD)
8/22/2016	0.381
8/23/2016	0.552
8/24/2016	0.539
8/25/2016	0.515
8/26/2016	0.555
8/27/2016	0.469
8/28/2016	0.714
8/29/2016	0.395
8/30/2016	0.462
8/31/2016	0.481
9/1/2016	0.4827
9/2/2016	0.7392
9/3/2016	0.5571
9/4/2016	0.5727
9/5/2016	0.4927
9/6/2016	0.4382
9/7/2016	0.4555
9/8/2016	0.4747
9/9/2016	0.5994
9/10/2016	0.4426
9/11/2016	0.562
9/12/2016	0.3326
9/13/2016	0.4851
9/14/2016	0.4699
9/15/2016	0.4475
9/16/2016	0.4923
9/17/2016	0.4699
9/18/2016	0.5127
9/19/2016	0.3802
9/20/2016	0.4574
9/21/2016	0.3802
9/22/2016	0.4574
9/23/2016	0.4993
9/24/2016	0.5621
9/25/2016	0.5601
9/26/2016	0.3351
9/27/2016	0.503
9/28/2016	0.3824
9/29/2016	0.4444

Date	Eff. Flow (MGD)
9/30/2016	0.5124
10/1/2016	0.4629
10/2/2016	0.4737
10/3/2016	0.3711
10/4/2016	0.4312
10/5/2016	0.441
10/6/2016	0.5792
10/7/2016	0.487
10/8/2016	0.4493
10/9/2016	0.7403
10/10/2016	0.1242
10/11/2016	0.4493
10/12/2016	0.4112
10/13/2016	0.4378
10/14/2016	0.4291
10/15/2016	0.3754
10/16/2016	0.586
10/17/2016	0.6655
10/18/2016	0.4562
10/19/2016	0.4733
10/20/2016	0.4754
10/21/2016	0.4311
10/22/2016	0.4856
10/23/2016	0.5307
10/24/2016	0.3238
10/25/2016	0.3807
10/26/2016	0.4443
10/27/2016	0.4486
10/28/2016	0.4329
10/29/2016	0.495
10/30/2016	0.5227
10/31/2016	0.3249
11/1/2016	0.4321
11/2/2016	0.422
11/3/2016	0.3299
11/4/2016	0.483
11/5/2016	0.5986
11/6/2016	0.5986
11/7/2016	0.2022

Date	Eff. Flow (MGD)
11/8/2016	0.3873
11/9/2016	0.381
11/10/2016	0.4132
11/11/2016	0.4186
11/12/2016	0.4916
11/13/2016	0.3706
11/14/2016	0.2933
11/15/2016	0.372
11/16/2016	0.3869
11/17/2016	0.4747
11/18/2016	0.3671
11/19/2016	0.2512
11/20/2016	0.3432
11/21/2016	0.3503
11/22/2016	0.3432
11/23/2016	0.3503
11/24/2016	0.439
11/25/2016	0.3676
11/26/2016	0.4165
11/27/2016	0.3645
11/28/2016	0.2837
11/29/2016	0.342
11/30/2016	0.3487
12/1/2016	0.3941
12/2/2016	0.3923
12/3/2016	0.3418
12/4/2016	0.3645
12/5/2016	0.1884
12/6/2016	0.2621
12/7/2016	0.2337
12/8/2016	0.2337
12/9/2016	0.2258
12/10/2016	0.2457
12/11/2016	0.2551
12/12/2016	0.1416
12/13/2016	0.2001
12/14/2016	0.1999
12/15/2016	0.1892
12/16/2016	0.1911

Date	Eff. Flow (MGD)
12/17/2016	0.2168
12/18/2016	0.2534
12/19/2016	0.1368
12/20/2016	0.1711
12/21/2016	0.1934
12/22/2016	0.2122
12/23/2016	0.2123
12/24/2016	0.1973
12/25/2016	0.2099
12/26/2016	0.1421
12/27/2016	0.2777
12/28/2016	0.2306
12/29/2016	0.2273
12/30/2016	0.2463
12/31/2016	0.2426
1/1/2017	0.2422
1/2/2017	0.2232
1/3/2017	0.2273
1/4/2017	0.1841
1/5/2017	0.1924
1/6/2017	0.1874
1/7/2017	0.2199
1/8/2017	0.2222
1/9/2017	0.1351
1/10/2017	0.1884
1/11/2017	0.1723
1/12/2017	0.1796
1/13/2017	0.2022
1/14/2017	0.2733
1/15/2017	0.2444
1/16/2017	0.1622
1/17/2017	0.2173
1/18/2017	0.1999
1/19/2017	0.2056
1/20/2017	0.2114
1/21/2017	0.2653
1/22/2017	0.1737
1/23/2017	0.307
1/24/2017	0.2326

Date	Eff. Flow (MGD)
1/25/2017	0.2133
1/26/2017	0.2831
1/27/2017	0.1937
1/28/2017	0.2613
1/29/2017	0.2058
1/30/2017	0.1521
1/31/2017	0.1668
2/1/2017	0.1947
2/2/2017	0.2
2/3/2017	0.205
2/4/2017	0.1774
2/5/2017	0.2277
2/6/2017	0.1532
2/7/2017	0.3333
2/8/2017	0.1936
2/9/2017	0.2001
2/10/2017	0.2205
2/11/2017	0.2539
2/12/2017	0.2563
2/13/2017	0.1353
2/14/2017	0.1741
2/15/2017	0.1775
2/16/2017	0.1871
2/17/2017	0.1815
2/18/2017	0.2006
2/19/2017	0.2325
2/20/2017	0.1562
2/21/2017	0.1745
2/22/2017	0.1974
2/23/2017	0.1822
2/24/2017	0.1608
2/25/2017	0.2725
2/26/2017	0.2453
2/27/2017	0.1256
2/28/2017	0.1971
3/1/2017	0.2015
3/2/2017	0.215
3/3/2017	0.1973
3/4/2017	0.1634

Date	Eff. Flow (MGD)
3/5/2017	0.2666
3/6/2017	0.1371
3/7/2017	0.2083
3/8/2017	0.2165
3/9/2017	0.1858
3/10/2017	0.212
3/11/2017	0.2566
3/12/2017	0.2487
3/13/2017	0.1206
3/14/2017	0.2179
3/15/2017	0.2051
3/16/2017	0.1972
3/17/2017	0.184
3/18/2017	0.2963
3/19/2017	0.2157
3/20/2017	0.1659
3/21/2017	0.2022
3/22/2017	0.2006
3/23/2017	0.2027
3/24/2017	0.1837
3/25/2017	0.2735
3/26/2017	0.2958
3/27/2017	0.1783
3/28/2017	0.2372
3/29/2017	0.2633
3/30/2017	0.2444
3/31/2017	0.3949
4/1/2017	0.4592
4/2/2017	0.4699
4/3/2017	0.3263
4/4/2017	0.649
4/5/2017	0.4951
4/6/2017	0.6913
4/7/2017	0.4638
4/8/2017	0.6096
4/9/2017	0.5102
4/10/2017	0.4249
4/11/2017	0.528
4/12/2017	0.4913

Date	Eff. Flow (MGD)
4/13/2017	0.4851
4/14/2017	0.5782
4/15/2017	0.4661
4/16/2017	0.6261
4/17/2017	0.4651
4/18/2017	0.4444
4/19/2017	0.4804
4/20/2017	0.4398
4/21/2017	0.4812
4/22/2017	0.4688
4/23/2017	0.5067
4/24/2017	0.6125
4/25/2017	0.5463
4/26/2017	0.4551
4/27/2017	0.5426
4/28/2017	0.4551
4/29/2017	0.6301
4/30/2017	0.4909
5/1/2017	0.4598
5/2/2017	0.5089
5/3/2017	0.4229
5/4/2017	0.4705
5/5/2017	0.6017
5/6/2017	0.4956
5/7/2017	0.4478
5/8/2017	0.3404
5/9/2017	0.4041
5/10/2017	0.3944
5/11/2017	0.3833
5/12/2017	0.3299
5/13/2017	0.526
5/14/2017	0.4673
5/15/2017	0.3489
5/16/2017	0.4089
5/17/2017	0.4333
5/18/2017	0.4091
5/19/2017	0.4529
5/20/2017	0.4661
5/21/2017	0.4077

Date	Eff. Flow (MGD)
5/22/2017	0.4531
5/23/2017	0.4016
5/24/2017	0.4994
5/25/2017	0.514
5/26/2017	0.4081
5/27/2017	0.7481
5/28/2017	0.7481
5/29/2017	0.8144
5/30/2017	0.4567
5/31/2017	0.3836
6/1/2017	0.3864
6/2/2017	0.3223
6/3/2017	0.5478
6/4/2017	0.4562
6/5/2017	0.4916
6/6/2017	0.4293
6/7/2017	0.4409
6/8/2017	0.491
6/9/2017	0.5321
6/10/2017	0.5712
6/11/2017	0.5772
6/12/2017	0.3506
6/13/2017	0.4993
6/14/2017	0.4738
6/15/2017	0.5311
6/16/2017	0.41
6/17/2017	0.4632
6/18/2017	0.4866
6/19/2017	0.5146
6/20/2017	0.4702
6/21/2017	0.4919
6/22/2017	0.4477
6/23/2017	0.5253
6/24/2017	0.5823
6/25/2017	0.469
6/26/2017	0.4145
6/27/2017	0.471
6/28/2017	0.4777
6/29/2017	0.4554

Date	Eff. Flow (MGD)
6/30/2017	0.4231
7/1/2017	0.6472
7/2/2017	0.6597
7/3/2017	0.5518
7/4/2017	0.7362
7/5/2017	0.5629
7/6/2017	0.5515
7/7/2017	0.4877
7/8/2017	0.6309
7/9/2017	0.5337
7/10/2017	0.3538
7/11/2017	0.4605
7/12/2017	0.454
7/13/2017	0.4424
7/14/2017	0.4857
7/15/2017	0.5888
7/16/2017	0.5354
7/17/2017	0.356
7/18/2017	0.4844
7/19/2017	0.5821
7/20/2017	0.4021
7/21/2017	0.4387
7/22/2017	0.5645
7/23/2017	0.5282
7/24/2017	0.4634
7/25/2017	0.4842
7/26/2017	0.4765
7/27/2017	0.4862
7/28/2017	0.567
7/29/2017	0.5007
7/30/2017	0.5672
7/31/2017	0.2892
8/1/2017	0.4437
8/2/2017	0.4506
8/3/2017	0.4475
8/4/2017	0.5128
8/5/2017	0.5776
8/6/2017	0.5057
8/7/2017	0.378

Date	Eff. Flow (MGD)
8/8/2017	0.4543
8/9/2017	0.4838
8/10/2017	0.4648
8/11/2017	0.6114
8/12/2017	0.5765
8/13/2017	0.6081
8/14/2017	0.4459
8/15/2017	0.5221
8/16/2017	0.5244
8/17/2017	0.481
8/18/2017	0.5891
8/19/2017	0.4895
8/20/2017	0.6199
8/21/2017	0.5296
8/22/2017	0.3397
8/23/2017	0.4284
8/24/2017	0.4495
8/25/2017	0.4978
8/26/2017	0.4222
8/27/2017	0.7356
8/28/2017	0.3194
8/29/2017	0.4791
8/30/2017	0.5008
8/31/2017	0.4777
9/1/2017	0.4124
9/2/2017	0.5688
9/3/2017	0.9546
9/4/2017	0.9985
9/5/2017	0.8322
9/6/2017	1.001
9/7/2017	0.9091
9/8/2017	0.4501
9/9/2017	0.4316
9/10/2017	0.3119
9/11/2017	0.3169
9/12/2017	0.5559
9/13/2017	0.5726
9/14/2017	0.469
9/15/2017	0.5455

Date	Eff. Flow (MGD)
9/16/2017	0.5031
9/17/2017	0.4921
9/18/2017	0.4602
9/19/2017	0.4345
9/20/2017	0.4221
9/21/2017	0.4592
9/22/2017	0.4044
9/23/2017	0.4174
9/24/2017	0.4691
9/25/2017	0.2699
9/26/2017	0.4197
9/27/2017	0.372
9/28/2017	0.4296
9/29/2017	0.3671
9/30/2017	0.3283
10/1/2017	0.4387
10/2/2017	0.3293
10/3/2017	0.3419
10/4/2017	0.3813
10/5/2017	0.3697
10/6/2017	0.3271
10/7/2017	0.4208
10/8/2017	0.3655
10/9/2017	0.5794
10/10/2017	0.4388
10/11/2017	0.427
10/12/2017	0.5336
10/13/2017	0.3217
10/14/2017	0.4975
10/15/2017	0.5443
10/16/2017	0.3501
10/17/2017	0.4133
10/18/2017	0.4156
10/19/2017	0.419
10/20/2017	0.4746
10/21/2017	0.4411
10/22/2017	0.4519
10/23/2017	0.7508
10/24/2017	0.5458

Date	Eff. Flow (MGD)
10/25/2017	0.5439
10/26/2017	0.4877
10/27/2017	0.4856
10/28/2017	0.4058
10/29/2017	0.5654
10/30/2017	0.417
10/31/2017	0.3948
11/1/2017	0.4136
11/2/2017	0.4821
11/3/2017	0.3181
11/4/2017	0.4321
11/5/2017	0.4725
11/6/2017	0.2594
11/7/2017	0.3496
11/8/2017	0.4436
11/9/2017	0.4926
11/10/2017	0.3178
11/11/2017	0.4465
11/12/2017	0.3932
11/13/2017	0.3178
11/14/2017	0.3251
11/15/2017	0.3383
11/16/2017	0.3183
11/17/2017	0.3254
11/18/2017	0.4211
11/19/2017	0.3234
11/20/2017	0.3277
11/21/2017	0.3277
11/22/2017	0.3382
11/23/2017	0.3616
11/24/2017	0.3489
11/25/2017	0.4086
11/26/2017	0.3978
11/27/2017	0.2702
11/28/2017	0.3098
11/29/2017	0.295
11/30/2017	0.2898
12/1/2017	0.3048
12/2/2017	0.3412

Date	Eff. Flow (MGD)
12/3/2017	0.3412
12/4/2017	0.2458
12/5/2017	0.2525
12/6/2017	0.2773
12/7/2017	0.2501
12/8/2017	0.2973
12/9/2017	0.3241
12/10/2017	0.3423
12/11/2017	0.2501
12/12/2017	0.2653
12/13/2017	0.2488
12/14/2017	0.2512
12/15/2017	0.2478
12/16/2017	0.2832
12/17/2017	0.3288
12/18/2017	0.1839
12/19/2017	0.2543
12/20/2017	0.2444
12/21/2017	0.2494
12/22/2017	0.2721
12/23/2017	0.3485
12/24/2017	0.2634
12/25/2017	0.2743
12/26/2017	0.2267
12/27/2017	0.2729
12/28/2017	0.244
12/29/2017	0.2911
12/30/2017	0.3932
12/31/2017	0.2563
1/1/2018	0.3485
1/2/2018	0.2313
1/3/2018	0.2711
1/4/2018	0.2867
1/5/2018	0.3102
1/6/2018	0.3708
1/7/2018	0.2673
1/8/2018	0.2486
1/9/2018	0.2795
1/10/2018	0.2991

Date	Eff. Flow (MGD)
1/11/2018	0.2588
1/12/2018	0.5157
1/13/2018	0.4575
1/14/2018	0.2596
1/15/2018	0.2844
1/16/2018	0.2677
1/17/2018	0.3452
1/18/2018	0.2187
1/19/2018	0.2987
1/20/2018	0.3058
1/21/2018	0.3294
1/22/2018	0.2564
1/23/2018	0.4632
1/24/2018	0.381
1/25/2018	0.2834
1/26/2018	0.2717
1/27/2018	0.3055
1/28/2018	0.3562
1/29/2018	0.2817
1/30/2018	0.2871
1/31/2018	0.2446
2/1/2018	0.2469
2/2/2018	0.2125
2/3/2018	0.2978
2/4/2018	0.2978
2/5/2018	0.2978
2/6/2018	0.2563
2/7/2018	0.2687
2/8/2018	0.3903
2/9/2018	0.3912
2/10/2018	0.3909
2/11/2018	0.3709
2/12/2018	0.3709
2/13/2018	0.3381
2/14/2018	0.3086
2/15/2018	0.2958
2/16/2018	0.3073
2/17/2018	0.306
2/18/2018	0.306

Date	Eff. Flow (MGD)
2/19/2018	0.306
2/20/2018	0.2724
2/21/2018	0.2891
2/22/2018	0.2798
2/23/2018	0.2695
2/24/2018	0.2961
2/25/2018	0.2961
2/26/2018	0.2961
2/27/2018	0.2628
2/28/2018	0.2224
3/1/2018	0.2882
3/2/2018	0.3573
3/3/2018	0.262
3/4/2018	0.262
3/5/2018	0.262
3/6/2018	0.2634
3/7/2018	0.3881
3/8/2018	0.2008
3/9/2018	0.2489
3/10/2018	0.2803
3/11/2018	0.2803
3/12/2018	0.2803
3/13/2018	0.249
3/14/2018	0.249
3/15/2018	0.249
3/16/2018	0.2639
3/17/2018	0.49
3/18/2018	0.49
3/19/2018	0.49
3/20/2018	0.63
3/21/2018	0.712
3/22/2018	0.508
3/23/2018	0.2804
3/24/2018	0.245
3/25/2018	0.275
3/26/2018	0.275
3/27/2018	0.2576
3/28/2018	0.2721
3/29/2018	0.2729

Date	Eff. Flow (MGD)
3/30/2018	0.2928
3/31/2018	0.2928
4/1/2018	0.3487
4/2/2018	0.3487
4/3/2018	0.3819
4/4/2018	0.441
4/5/2018	0.4004
4/6/2018	0.3999
4/7/2018	0.4495
4/8/2018	0.4495
4/9/2018	0.4495
4/10/2018	0.4033
4/11/2018	0.4344
4/12/2018	0.3329
4/13/2018	0.4488
4/14/2018	0.4643
4/15/2018	0.4643
4/16/2018	0.4643
4/17/2018	0.3578
4/18/2018	0.3235
4/19/2018	0.3843
4/20/2018	0.3396
4/21/2018	0.3717
4/22/2018	0.3717
4/23/2018	0.3717
4/24/2018	0.6589
4/25/2018	0.6003
4/26/2018	0.4389
4/27/2018	0.4266
4/28/2018	0.4327
4/29/2018	0.4327
4/30/2018	0.4327
5/1/2018	0.3629
5/2/2018	0.378
5/3/2018	0.3773
5/4/2018	0.3391
5/5/2018	0.4002
5/6/2018	0.4002
5/7/2018	0.4002

Date	Eff. Flow (MGD)
5/8/2018	0.3633
5/9/2018	0.3435
5/10/2018	0.382
5/11/2018	0.3101
5/12/2018	0.52
5/13/2018	0.52
5/14/2018	0.52
5/15/2018	0.3918
5/16/2018	0.5079
5/17/2018	0.5893
5/18/2018	0.419
5/19/2018	0.6403
5/20/2018	0.6403
5/21/2018	0.6403
5/22/2018	0.4428
5/23/2018	0.4293
5/24/2018	0.4511
5/25/2018	0.4129
5/26/2018	0.5394
5/27/2018	0.5394
5/28/2018	0.5394
5/29/2018	0.5394
5/30/2018	1.112
5/31/2018	0.753
6/1/2018	0.6814
6/2/2018	0.7377
6/3/2018	0.7377
6/4/2018	0.7377
6/5/2018	0.9529
6/6/2018	0.8951
6/7/2018	0.7483
6/8/2018	0.6825
6/9/2018	0.5937
6/10/2018	0.5933
6/11/2018	0.5933
6/12/2018	0.5491
6/13/2018	0.5179
6/14/2018	0.5193
6/15/2018	0.4783

Date	Eff. Flow (MGD)
6/16/2018	0.4933
6/17/2018	0.4939
6/18/2018	0.4939
6/19/2018	0.4982
6/20/2018	0.4755
6/21/2018	0.4463
6/22/2018	0.4871
6/23/2018	0.4871
6/24/2018	0.4871
6/25/2018	0.4871
6/26/2018	0.5168
6/27/2018	0.5371
6/28/2018	0.4143
6/29/2018	0.4029
6/30/2018	0.5075
7/1/2018	0.5075
7/2/2018	0.5075
7/3/2018	0.559
7/4/2018	0.5803
7/5/2018	0.5803
7/6/2018	0.9172
7/7/2018	0.7648
7/8/2018	0.7648
7/9/2018	0.7648
7/10/2018	0.6127
7/11/2018	0.6791
7/12/2018	0.5223
7/13/2018	0.6173
7/14/2018	0.6532
7/15/2018	0.6532
7/16/2018	0.6532
7/17/2018	0.5707
7/18/2018	0.6348
7/19/2018	0.6439
7/20/2018	0.6065
7/21/2018	0.5907
7/22/2018	0.5907
7/23/2018	0.5907
7/24/2018	0.5253

Date	Eff. Flow (MGD)
7/25/2018	0.5059
7/26/2018	0.5353
7/27/2018	0.5192
7/28/2018	0.5281
7/29/2018	0.5581
7/30/2018	0.5581
7/31/2018	0.5283
8/1/2018	0.4264
8/2/2018	0.4808
8/3/2018	0.5669
8/4/2018	0.6461
8/5/2018	0.6461
8/6/2018	0.6461
8/7/2018	0.447
8/8/2018	0.4209
8/9/2018	0.406
8/10/2018	0.6419
8/11/2018	0.8396
8/12/2018	0.8396
8/13/2018	0.8396
8/14/2018	0.6771
8/15/2018	0.6829
8/16/2018	0.7262
8/17/2018	0.6972
8/18/2018	0.63
8/19/2018	0.63
8/20/2018	0.63
8/21/2018	0.5891
8/22/2018	0.5893
8/23/2018	0.7322
8/24/2018	0.5811
8/25/2018	0.936
8/26/2018	0.936
8/27/2018	0.936
8/28/2018	0.7092
8/29/2018	0.7817
8/30/2018	0.5822
8/31/2018	0.6012
9/1/2018	0.7052

Date	Eff. Flow (MGD)
9/2/2018	0.7052
9/3/2018	0.7052
9/4/2018	0.7052
9/5/2018	0.6286
9/6/2018	0.6329
9/7/2018	0.6399
9/8/2018	0.6442
9/9/2018	0.6442
9/10/2018	0.6442
9/11/2018	0.6291
9/12/2018	0.449
9/13/2018	0.3528
9/14/2018	0.3499
9/15/2018	0.4833
9/16/2018	0.4832
9/17/2018	0.4832
9/18/2018	0.4642
9/19/2018	0.7891
9/20/2018	0.6309
9/21/2018	0.6971
9/22/2018	0.641
9/23/2018	0.641
9/24/2018	0.641
9/25/2018	0.6302
9/26/2018	0.6092
9/27/2018	0.5714
9/28/2018	0.5802
9/29/2018	0.701
9/30/2018	0.701
10/1/2018	0.701
10/2/2018	0.6702
10/3/2018	0.5502
10/4/2018	0.5113
10/5/2018	0.5014
10/6/2018	0.5555
10/7/2018	0.5555
10/8/2018	0.5555
10/9/2018	0.5086
10/10/2018	0.4917

Date	Eff. Flow (MGD)
10/11/2018	0.7686
10/12/2018	0.9811
10/13/2018	0.6528
10/14/2018	0.6528
10/15/2018	0.6528
10/16/2018	0.5819
10/17/2018	0.6028
10/18/2018	0.5804
10/19/2018	0.5809
10/20/2018	0.4686
10/21/2018	0.4686
10/22/2018	0.4686
10/23/2018	0.4578
10/24/2018	0.4572
10/25/2018	0.4598
10/26/2018	0.5004
10/27/2018	0.6161
10/28/2018	0.6161
10/29/2018	0.6161
10/30/2018	0.4749
10/31/2018	0.461
11/1/2018	0.4254
11/2/2018	0.4442
11/3/2018	0.4579
11/4/2018	0.4579
11/5/2018	0.4579
11/6/2018	0.414
11/7/2018	0.4401
11/8/2018	0.4029
11/9/2018	0.516
11/10/2018	0.5122
11/11/2018	0.5122
11/12/2018	0.5122
11/13/2018	0.6122
11/14/2018	0.3735
11/15/2018	0.7811
11/16/2018	0.3979
11/17/2018	0.5136
11/18/2018	0.5736

Date	Eff. Flow (MGD)
11/19/2018	0.5736
11/20/2018	0.7719
11/21/2018	0.6466
11/22/2018	0.6972
11/23/2018	0.6972
11/24/2018	0.6447
11/25/2018	0.6447
11/26/2018	0.6447
11/27/2018	0.5899
11/28/2018	0.5509
11/29/2018	0.5332
11/30/2018	0.4899
12/1/2018	0.4674
12/2/2018	0.4674
12/3/2018	0.4674
12/4/2018	0.4698
12/5/2018	0.4591
12/6/2018	0.4216
12/7/2018	0.4555
12/8/2018	0.4555
12/9/2018	0.4555
12/10/2018	0.4555
12/11/2018	0.502
12/12/2018	0.502
12/13/2018	0.4351
12/14/2018	0.4388
12/15/2018	0.597
12/16/2018	0.597
12/17/2018	0.597
12/18/2018	0.4437
12/19/2018	0.4817
12/20/2018	0.4504
12/21/2018	0.8569
12/22/2018	0.7939
12/23/2018	0.7939
12/24/2018	0.7939
12/25/2018	
12/26/2018	0.545
12/27/2018	0.4975

Date	Eff. Flow (MGD)
12/28/2018	0.6179
12/29/2018	0.7363
12/30/2018	0.7366
12/31/2018	0.7366
1/1/2019	
1/2/2019	0.6535
1/3/2019	0.4937
1/4/2019	0.5644
1/5/2019	0.7418
1/6/2019	0.7418
1/7/2019	0.7418
1/8/2019	0.7496
1/9/2019	0.7095
1/10/2019	0.6621
1/11/2019	0.4899
1/12/2019	0.5018
1/13/2019	0.5018
1/14/2019	0.5018
1/15/2019	0.5412
1/16/2019	0.4298
1/17/2019	0.4219
1/18/2019	0.4401
1/19/2019	0.4922
1/20/2019	0.4922
1/21/2019	0.4922
1/22/2019	0.446
1/23/2019	0.3834
1/24/2019	0.5815
1/25/2019	0.5335
1/26/2019	0.5372
1/27/2019	0.5372
1/28/2019	0.5372
1/29/2019	0.4662
1/30/2019	0.4503
1/31/2019	0.4109
2/1/2019	0.4081
2/2/2019	0.4579
2/3/2019	0.4579
2/4/2019	0.4579

Date	Eff. Flow (MGD)
2/5/2019	0.4222
2/6/2019	0.4808
2/7/2019	0.4202
2/8/2019	0.4449
2/9/2019	0.4586
2/10/2019	0.4586
2/11/2019	0.4586
2/12/2019	0.4302
2/13/2019	0.4301
2/14/2019	0.3604
2/15/2019	0.4119
2/16/2019	0.4636
2/17/2019	0.4635
2/18/2019	0.4635
2/19/2019	0.4442
2/20/2019	0.5232
2/21/2019	0.6412
2/22/2019	0.7109
2/23/2019	0.6232
2/24/2019	0.6232
2/25/2019	0.6232
2/26/2019	0.7012
2/27/2019	0.7409
2/28/2019	0.5901
3/1/2019	0.6112
3/2/2019	0.4905
3/3/2019	0.4905
3/4/2019	0.4905
3/5/2019	0.4337
3/6/2019	0.4657
3/7/2019	0.4777
3/8/2019	0.3817
3/9/2019	0.4613
3/10/2019	0.4613
3/11/2019	0.1613
3/12/2019	0.484
3/13/2019	0.4723
3/14/2019	0.4447
3/15/2019	0.507

Date	Eff. Flow (MGD)
3/16/2019	0.4396
3/17/2019	0.4396
3/18/2019	0.4396
3/19/2019	0.4872
3/20/2019	0.4491
3/21/2019	0.4099
3/22/2019	0.4345
3/23/2019	0.4249
3/24/2019	0.4249
3/25/2019	0.4249
3/26/2019	0.4146
3/27/2019	0.4033
3/28/2019	0.3995
3/29/2019	0.4335
3/30/2019	0.4399
3/31/2019	0.4399
4/1/2019	0.4399
4/2/2019	0.4419
4/3/2019	0.5898
4/4/2019	0.3161
4/5/2019	0.4469
4/6/2019	0.4356
4/7/2019	0.4111
4/8/2019	0.4876
4/9/2019	0.4469
4/10/2019	0.441
4/11/2019	0.4481
4/12/2019	0.4537
4/13/2019	0.5646
4/14/2019	0.5646
4/15/2019	0.5646
4/16/2019	0.5881
4/17/2019	0.5893
4/18/2019	0.5018
4/19/2019	0.4358
4/20/2019	0.8471
4/21/2019	0.8471
4/22/2019	0.8471
4/23/2019	0.7154

Date	Eff. Flow (MGD)
4/24/2019	0.6639
4/25/2019	0.5339
4/26/2019	0.5471
4/27/2019	0.6505
4/28/2019	0.6505
4/29/2019	0.6505
4/30/2019	0.5331
5/1/2019	0.5812
5/2/2019	0.5813
5/3/2019	0.4987
5/4/2019	0.5379
5/5/2019	0.5379
5/6/2019	0.5379
5/7/2019	0.4889
5/8/2019	0.5947
5/9/2019	0.5114
5/10/2019	0.4982
5/11/2019	0.7952
5/12/2019	0.7952
5/13/2019	0.7952
5/14/2019	0.7295
5/15/2019	0.7229
5/16/2019	0.5204
5/17/2019	0.6349
5/18/2019	0.6877
5/19/2019	0.6877
5/20/2019	0.6877
5/21/2019	0.6279
5/22/2019	0.5993
5/23/2019	0.6307
5/24/2019	0.6455
5/25/2019	0.7919
5/26/2019	0.7919
5/27/2019	
5/28/2019	0.7919
5/29/2019	0.664
5/30/2019	0.7876
5/31/2019	0.6201
6/1/2019	0.8275

Date	Eff. Flow (MGD)
6/2/2019	0.8275
6/3/2019	0.8275
6/4/2019	0.7703
6/5/2019	0.6025
6/6/2019	0.5474
6/7/2019	0.4861
6/8/2019	0.817619
6/9/2019	0.7986
6/10/2019	0.8176
6/11/2019	0.5384
6/12/2019	0.44576
6/13/2019	0.7059
6/14/2019	0.7112
6/15/2019	0.7157
6/16/2019	0.7157
6/17/2019	0.7157
6/18/2019	0.6438
6/19/2019	0.6215
6/20/2019	0.6119
6/21/2019	0.6717
6/22/2019	0.6697
6/23/2019	0.6697
6/24/2019	0.6697
6/25/2019	0.7055
6/26/2019	0.5966
6/27/2019	0.6058
6/28/2019	0.5077
6/29/2019	0.7855
6/30/2019	0.7855
7/1/2019	0.7855
7/2/2019	0.7911
7/3/2019	0.7002
7/4/2019	
7/5/2019	0.6715
7/6/2019	0.6717
7/7/2019	0.6719
7/8/2019	0.6719
7/9/2019	0.6038
7/10/2019	0.547

Date	Eff. Flow (MGD)
7/11/2019	0.5347
7/12/2019	0.633
7/13/2019	0.6698
7/14/2019	0.6698
7/15/2019	0.6698
7/16/2019	0.6655
7/17/2019	0.5702
7/18/2019	0.5558
7/19/2019	0.5821
7/20/2019	0.5796
7/21/2019	0.5796
7/22/2019	0.5796
7/23/2019	0.5345
7/24/2019	0.5475
7/25/2019	0.5119
7/26/2019	0.5329
7/27/2019	0.6643
7/28/2019	0.6643
7/29/2019	0.6643
7/30/2019	0.5813
7/31/2019	0.4976
8/1/2019	0.6733
8/2/2019	0.585
8/3/2019	0.5412
8/4/2019	0.5412
8/5/2019	0.5412
8/6/2019	0.7111
8/7/2019	0.5879
8/8/2019	0.4899
8/9/2019	0.521
8/10/2019	0.6133
8/11/2019	0.6133
8/12/2019	0.6133
8/13/2019	0.6602
8/14/2019	0.4883
8/15/2019	0.5201
8/16/2019	0.5984
8/17/2019	0.5984
8/18/2019	0.5984

Date	Eff. Flow (MGD)
8/19/2019	0.5984
8/20/2019	0.4659
8/21/2019	0.5121
8/22/2019	0.4482
8/23/2019	0.4482
8/24/2019	0.4883
8/25/2019	0.4883
8/26/2019	0.4883
8/27/2019	0.4252
8/28/2019	0.4698
8/29/2019	0.4602
8/30/2019	0.4699
8/31/2019	0.4652
9/1/2019	0.5592
9/2/2019	0.5592
9/3/2019	0.5548
9/4/2019	0.4997
9/5/2019	0.6071
9/6/2019	0.5987
9/7/2019	0.594
9/8/2019	0.594
9/9/2019	0.594
9/10/2019	0.6679
9/11/2019	0.6375
9/12/2019	0.5473
9/13/2019	0.5155
9/14/2019	0.6321
9/15/2019	0.6321
9/16/2019	0.6321
9/17/2019	0.5575
9/18/2019	0.4673
9/19/2019	0.4689
9/20/2019	0.506
9/21/2019	0.506
9/22/2019	0.506
9/23/2019	0.506
9/24/2019	0.4583
9/25/2019	0.4501
9/26/2019	0.5728

Date	Eff. Flow (MGD)
9/27/2019	0.4501
9/28/2019	0.48
9/29/2019	0.48
9/30/2019	0.48
10/1/2019	0.4926
10/2/2019	0.5927
10/3/2019	0.5972
10/4/2019	0.4899
10/5/2019	0.5262
10/6/2019	0.5262
10/7/2019	0.5262
10/8/2019	0.4913
10/9/2019	0.5127
10/10/2019	0.5193
10/11/2019	0.4697
10/12/2019	0.5762
10/13/2019	0.5762
10/14/2019	0.5762
10/15/2019	0.4921
10/16/2019	0.4961
10/17/2019	0.5395
10/18/2019	0.4303
10/19/2019	0.5362
10/20/2019	0.5362
10/21/2019	0.5362
10/22/2019	0.5039
10/23/2019	0.5029
10/24/2019	0.5179
10/25/2019	0.5029
10/26/2019	0.5578
10/27/2019	0.5578
10/28/2019	0.5578
10/29/2019	0.5583
10/30/2019	0.5114
10/31/2019	0.9234
11/1/2019	0.6667
11/2/2019	0.5443
11/3/2019	0.5443
11/4/2019	0.5443

Date	Eff. Flow (MGD)
11/5/2019	0.5199
11/6/2019	0.4894
11/7/2019	0.5267
11/8/2019	0.5189
11/9/2019	0.5314
11/10/2019	0.5314
11/11/2019	0.5314
11/12/2019	0.4675
11/13/2019	0.4653
11/14/2019	0.4908
11/15/2019	0.4343
11/16/2019	0.4851
11/17/2019	0.4851
11/18/2019	0.4851
11/19/2019	0.5253
11/20/2019	0.4866
11/21/2019	0.4655
11/22/2019	0.4384
11/23/2019	0.4551
11/24/2019	0.4551
11/25/2019	0.4551
11/26/2019	0.4481
11/27/2019	0.46579
11/28/2019	0.46579
11/29/2019	0.4958
11/30/2019	0.46579
12/1/2019	0.4791
12/2/2019	0.4791
12/3/2019	0.3393
12/4/2019	0.3393
12/5/2019	0.3372
12/6/2019	0.2748
12/7/2019	0.2883
12/8/2019	0.2883
12/9/2019	0.2883
12/10/2019	0.2859
12/11/2019	0.2892
12/12/2019	0.2351
12/13/2019	0.2516

Date	Eff. Flow (MGD)
12/14/2019	0.2961
12/15/2019	0.2961
12/16/2019	0.2961
12/17/2019	0.2909
12/18/2019	0.2882
12/19/2019	0.2149
12/20/2019	0.2317
12/21/2019	0.2778
12/22/2019	0.2778
12/23/2019	0.2778
12/24/2019	0.3951
12/27/2019	0.292
12/28/2019	0.3331
12/29/2019	0.3331
12/30/2019	0.3331
12/31/2019	0.3127
1/2/2020	0.3059
1/3/2020	0.3441
1/4/2020	0.301
1/5/2020	0.3016
1/6/2020	0.2492
1/7/2020	0.2423
1/8/2020	0.2418
1/9/2020	0.247
1/10/2020	0.4045
1/11/2020	0.4045
1/12/2020	0.4045
1/13/2020	0.4045
1/14/2020	0.3241
1/15/2020	0.3367
1/16/2020	0.3109
1/17/2020	0.2964
1/18/2020	0.297
1/19/2020	0.297
1/20/2020	0.297
1/21/2020	0.2676
1/22/2020	0.2625
1/23/2020	0.264
1/24/2020	0.2779

Date	Eff. Flow (MGD)
1/25/2020	0.3682
1/26/2020	0.3682
1/27/2020	0.3682
1/28/2020	0.2849
1/29/2020	0.2442
1/30/2020	0.277
1/31/2020	0.2585
2/1/2020	0.2474
2/2/2020	0.2674
2/3/2020	0.2674
2/4/2020	0.2548
2/5/2020	0.2552
2/6/2020	0.4063
2/7/2020	0.8958
2/8/2020	0.5003
2/9/2020	0.5003
2/10/2020	0.5003
2/11/2020	0.3906
2/12/2020	0.3885
2/13/2020	0.3637
2/14/2020	0.5483
2/15/2020	0.6417
2/16/2020	0.6412
2/17/2020	0.6412
2/18/2020	0.6601
2/19/2020	0.6291
2/20/2020	0.6291
2/21/2020	0.6291
2/22/2020	0.576
2/23/2020	0.576
2/24/2020	0.576
2/25/2020	0.63
2/26/2020	0.6989
2/27/2020	0.7177
2/28/2020	0.6812
2/29/2020	0.5853
3/1/2020	0.5853
3/2/2020	0.5853
3/3/2020	0.591

Date	Eff. Flow (MGD)
3/4/2020	0.8712
3/5/2020	0.5033
3/6/2020	0.6003
3/7/2020	0.5167
3/8/2020	0.5169
3/9/2020	0.5169
3/10/2020	0.57
3/11/2020	0.4989
3/12/2020	0.51
3/13/2020	0.6663
3/14/2020	0.5089
3/15/2020	0.5089
3/16/2020	0.5089
3/17/2020	0.5198
3/18/2020	0.5919
3/19/2020	0.46
3/20/2020	0.4416
3/21/2020	0.5923
3/22/2020	0.592
3/23/2020	0.5923
3/24/2020	0.6025
3/25/2020	0.6908
3/26/2020	0.5569
3/27/2020	0.4883
3/28/2020	0.5997
3/29/2020	0.5997
3/30/2020	0.5997
3/31/2020	0.4187
4/1/2020	0.4046
4/2/2020	0.4077
4/3/2020	0.4049
4/4/2020	0.448
4/5/2020	0.448
4/6/2020	0.448
4/7/2020	0.4767
4/8/2020	0.4788
4/9/2020	0.4401
4/10/2020	0.3236
4/11/2020	0.4748

Date	Eff. Flow (MGD)
4/12/2020	0.4748
4/13/2020	0.4748
4/14/2020	0.6226
4/15/2020	0.6469
4/16/2020	0.5095
4/17/2020	0.4043
4/18/2020	0.4646
4/19/2020	0.4646
4/20/2020	0.4646
4/21/2020	0.4443
4/22/2020	0.4389
4/23/2020	0.456
4/24/2020	0.5013
4/25/2020	0.4815
4/26/2020	0.4815
4/27/2020	0.4815
4/28/2020	0.4
4/29/2020	0.4387
4/30/2020	0.7693
5/1/2020	0.6442
5/2/2020	0.5253
5/3/2020	0.5253
5/4/2020	0.5253
5/5/2020	0.5276
5/6/2020	0.4709
5/7/2020	0.4882
5/8/2020	0.3818
5/9/2020	0.4019
5/10/2020	0.4019
5/11/2020	0.4019
5/12/2020	0.4414
5/13/2020	0.4322
5/14/2020	0.4505
5/15/2020	0.4902
5/16/2020	0.4902
5/17/2020	0.4902
5/18/2020	0.6494
5/19/2020	1.17
5/20/2020	1.197

Date	Eff. Flow (MGD)
5/21/2020	0.762
5/22/2020	0.9371
5/23/2020	0.9371
5/24/2020	0.9371
5/25/2020	0.9371
5/26/2020	0.9371
5/27/2020	0.6836
5/28/2020	0.7088
5/29/2020	0.6381
5/30/2020	0.6259
5/31/2020	0.6259
6/1/2020	0.6259
6/2/2020	0.6361
6/3/2020	0.5766
6/4/2020	0.5699
6/5/2020	0.6782
6/6/2020	0.6375
6/7/2020	0.6375
6/8/2020	0.6375
6/9/2020	0.6232
6/10/2020	0.6297
6/11/2020	0.5481
6/12/2020	0.5883
6/13/2020	0.5761
6/14/2020	0.5761
6/15/2020	0.5761
6/16/2020	0.6081
6/17/2020	0.6069
6/18/2020	0.6142
6/19/2020	0.5742
6/20/2020	0.6064
6/21/2020	0.6064
6/22/2020	0.6064
6/23/2020	0.5977
6/24/2020	0.5636
6/25/2020	0.5173
6/26/2020	0.5189
6/27/2020	0.593
6/28/2020	0.593

Date	Eff. Flow (MGD)
6/29/2020	0.593
6/30/2020	0.62
7/1/2020	0.5667
7/2/2020	0.5725
7/3/2020	0.6254
7/4/2020	0.6254
7/5/2020	0.6254
7/6/2020	0.6254
7/7/2020	0.6398
7/8/2020	0.5527
7/9/2020	0.5202
7/10/2020	0.5489
7/11/2020	0.5859
7/12/2020	0.5859
7/13/2020	0.5859
7/14/2020	0.5444
7/15/2020	0.5283
7/16/2020	0.4816
7/17/2020	0.5072
7/18/2020	0.5765
7/19/2020	0.5765
7/20/2020	0.5765
7/21/2020	0.7532

Description	Flow (MGD)
2019 ADF	0.5355
Est. Lake Infiltration	0.4000
Est. Residential Flow	0.1355
Peaking Factor	4
Peak Hourly RF	0.542
PHF	0.942
Max Historic Instantaneous Flow	1.33

NPDES Monthly Avg Flow										
Month	Avg Flow	BOD	TSS	NH3	ppdBOD	#TSS	#NH3	Season	Limits	
Jan-19	0.5416	4.9636	21.146	5.3133	22.420	95.515	24.000	Winter	10.4	
Feb-19	0.5061	6.2375	21.328	5.225	26.328	90.023	22.054	Winter	10.4	
Mar-19	0.4432	7.0125	21.845	7.625	25.920	80.745	28.184	Winter	10.4	
Apr-19	0.5551	8.3	21.927	6.5714	38.425	101.511	30.423	Summer	5.2	
May-19	0.6458	7.2222	21.379	6.5923	38.899	115.146	35.506	Summer	5.2	
Jun-19	0.6805	8.15	21.133	7.9333	46.254	119.938	45.024	Summer	5.2	
Jul-19	0.6201	15.2	21.155	10.9467	78.609	109.408	56.612	Summer	5.2	
Aug-19	0.5395	7.5583	19.913	10.45	34.008	89.597	47.019	Summer	5.2	
Sep-19	0.5438	9.1231	20.62	9.2385	41.376	93.518	41.899	Summer	5.2	
Oct-19	0.5398	6.9929	21.006	9.6	31.482	94.567	43.219	Summer	5.2	
Nov-19	0.4961	5.7083	21.14	7.8917	23.618	87.464	32.652	Winter	10.4	
Dec-19	0.3077	7.9231	23.462	10.9231	20.332	60.207	28.031	Winter	10.4	

RUMBLING BALD RESORT DAILY FLOW RATES

METERED

YEAR: 2019

Date	Flow 8A	Flow 8B	Total Flow	Rainfall
1/1/2019	58,300	7,030	65,330	0.05
1/2/2019	51,900	16,240	68,140	0
1/3/2019	54,300	5,090	59,390	0.73
1/4/2019	58,450	5,100	63,550	0
1/5/2019	58,450	5,100	63,550	0
1/6/2019	50,800	19,150	69,950	0
1/7/2019	51,400	12,160	63,560	0
1/8/2019	53,400	12,160	65,560	0
1/9/2019	45,400	9,440	54,840	0
1/10/2019	45,400	6,200	51,600	0
1/11/2019	37,900	7,570	45,470	0
1/12/2019	37,700	8,020	45,720	0
1/13/2019	37,700	8,020	45,720	0
1/14/2019	31,000	7,830	38,830	0
1/15/2019	36,500	10,030	46,530	0
1/16/2019	33,300	5,980	39,280	0.15
1/17/2019	33,000	6,020	39,020	1.04
1/18/2019	28,800	5,810	34,610	0
1/19/2019	44,300	10,900	55,200	0
1/20/2019	48,200	28,030	76,230	0
1/21/2019	32,650	8,450	41,100	1
1/22/2019	32,650	10,990	43,640	0
1/23/2019	32,500	9,520	42,020	0
1/24/2019	43,300	24,660	67,960	0
1/25/2019	45,000	17,630	62,630	0
1/26/2019	32,950	7,210	40,160	0
1/27/2019	35,500	6,730	42,230	0.03
1/28/2019	41,980	7,880	49,860	0
1/29/2019	29,600	8,050	37,650	0
1/30/2019	35,200	7,270	42,470	0
1/31/2019	31,500	6,600	38,100	0
2/1/2019	27,800	7,140	34,940	0
2/2/2019	32,300	7,590	39,890	0
2/3/2019	32,300	7,590	39,890	0
2/4/2019	36,900	6,410	43,310	0
2/5/2019	40,000	6,410	46,410	0
2/6/2019	38,000	9,070	47,070	0
2/7/2019	34,200	11,640	45,840	0
2/8/2019	40,200	11,820	52,020	0.23
2/9/2019	39,000	11,520	50,520	0
2/10/2019	34,700	13,230	47,930	0.9
2/11/2019	25,600	11,850	37,450	0
2/12/2019	35,300	11,170	46,470	0.28
2/13/2019	38,000	23,530	61,530	0
2/14/2019	31,700	14,020	45,720	0.03
2/15/2019	30,400	15,900	46,300	1.52
2/16/2019	36,600	18,630	55,230	0
2/17/2019	39,300	33,820	73,120	1
2/18/2019	44,200	33,820	78,020	1.5
2/19/2019	38,000	19,920	57,920	1.41
2/20/2019	40,700	40,220	80,920	0.48
2/21/2019	53,600	61,490	115,090	0.57
2/22/2019	58,000	61,490	119,490	0
2/23/2019	50,100	45,280	95,380	0
2/24/2019	50,100	45,280	95,380	0.07
2/25/2019	46,000	45,280	91,280	0

Flow Rate Summary		
Month	ADF	
Jan-19	51,610	-26.16%
Feb-19	61,601	-11.87%
Mar-19	58,319	-16.57%
Apr-19	62,815	-10.13%
May-19	65,728	-5.97%
Jun-19	92,507	32.34%
Jul-19	113,846	62.87%
Aug-19	77,410	10.75%
Sep-19	Missing	
Oct-19	73,297	4.86%
Nov-19	67,256	-3.78%
Dec-19	44,495	-36.34%
Mean	69,899	

Rumbling Bald Resort Daily Flow Rates

Maximum Daily Flow (MDF) 223,960.00 gpd
 Date of MDF 7/22/2019
 Peaking Factor 3.20

Average Daily Flow (ADF) 69,934.48 gpd
 Maximum Monthly ADF 113,846.00 gpd

Population Calculations

Equivalent Population Rate 70 gpd/capita

Equivalent Population (EP) based on ADF

EP (ADF)	999 persons
EP (Maximum Monthly ADF)	1,626 persons

Date	Flow 8A	Flow 8B	Total Flow	Rainfall
2/26/2019	49,500	15,270	64,770	0.23
2/27/2019	43,800	12,400	56,200	0.47
2/28/2019	38,100	18,630	56,730	0
3/1/2019	38,400	11,940	50,340	0.38
3/2/2019	46,400	20,460	66,860	0
3/3/2019	46,700	20,130	66,830	0
3/4/2019	34,700	14,740	49,440	0
3/5/2019	38,400	19,470	57,870	0
3/6/2019	40,100	15,600	55,700	0.56
3/7/2019	40,700	11,240	51,940	0.22
3/8/2019	42,200	14,200	56,400	0
3/9/2019	38,600	14,460	53,060	0
3/10/2019	37,200	19,540	56,740	0
3/11/2019	51,800	19,540	71,340	0
3/12/2019	38,600	4,320	42,920	0.76
3/13/2019	43,600	16,270	59,870	0.07
3/14/2019	37,500	16,080	53,580	0
3/15/2019	49,000	34,810	83,810	0
3/16/2019	41,400	21,040	62,440	0
3/17/2019	41,400	21,040	62,440	0
3/18/2019	44,700	20,280	64,980	0
3/19/2019	49,000	16,460	65,460	0
3/20/2019	41,700	14,630	56,330	0
3/21/2019	38,800	14,380	53,180	0
3/22/2019	44,500	14,050	58,550	0
3/23/2019	42,300	14,000	56,300	0.21
3/24/2019	42,300	14,000	56,300	0
3/25/2019	38,700	17,730	56,430	0
3/26/2019	39,000	12,040	51,040	0
3/27/2019	48,500	17,570	66,070	0
3/28/2019	37,200	9,650	46,850	0.11
3/29/2019	46,500	10,770	57,270	0
3/30/2019	47,600	12,830	60,430	0
3/31/2019	44,700	12,420	57,120	0
4/1/2019	35,200	12,780	47,980	0
4/2/2019	43,000	10,060	53,060	0
4/3/2019	34,100	10,220	44,320	0
4/4/2019	42,300	10,450	52,750	0
4/5/2019	39,100	11,310	50,410	1.56
4/6/2019	43,200	16,170	59,370	0
4/7/2019	43,200	16,170	59,370	0
4/8/2019	42,900	17,660	60,560	0.16
4/9/2019	37,500	16,510	54,010	0
4/10/2019	45,700	19,320	65,020	0.45
4/11/2019	32,900	11,280	44,180	1.49
4/12/2019	1	11,250	11,251	0
4/13/2019	40,500	25,620	66,120	0
4/14/2019	40,500	25,620	66,120	0
4/15/2019	56,200	25,620	81,820	0
4/16/2019	48,700	15,540	64,240	2.46
4/17/2019	41,000	19,360	60,360	0.03
4/18/2019	50,200	10,140	60,340	0
4/19/2019	44,900	45,355	90,255	0
4/20/2019	87,000	45,355	132,355	0
4/21/2019	59,400	19,080	78,480	0
4/22/2019	46,700	12,630	59,330	0.76
4/23/2019	46,800	13,810	60,610	0
4/24/2019	43,600	13,810	57,410	0
4/25/2019	43,900	17,250	61,150	0
4/26/2019	47,200	17,960	65,160	0.21

Date	Flow 8A	Flow 8B	Total Flow	Rainfall
4/27/2019	45,000	15,200	60,200	0.23
4/28/2019	45,000	15,200	60,200	0.25
4/29/2019	74,600	18,240	92,840	1.47
4/30/2019	56,300	8,890	65,190	0
5/1/2019	85,100	12,270	97,370	0
5/2/2019	43,900	12,740	56,640	0
5/3/2019	42,200	13,020	55,220	0
5/4/2019	45,200	15,770	60,970	0
5/5/2019	45,400	15,770	61,170	0
5/6/2019	37,300	20,530	57,830	0
5/7/2019	39,900	14,410	54,310	0
5/8/2019	40,900	14,410	55,310	0
5/9/2019	43,400	11,080	54,480	0
5/10/2019	42,800	23,900	66,700	0
5/11/2019	54,150	21,005	75,155	0
5/12/2019	54,750	21,005	75,755	0
5/13/2019	47,100	13,620	60,720	0
5/14/2019	44,400	10,360	54,760	0
5/15/2019	49,100	10,360	59,460	0
5/16/2019	45,900	12,030	57,930	0
5/17/2019	44,600	14,040	58,640	0
5/18/2019	54,100	15,550	69,650	0
5/19/2019	54,100	15,550	69,650	0
5/20/2019	57,000	15,360	72,360	0
5/21/2019	53,800	12,670	66,470	0.07
5/22/2019	52,500	14,490	66,990	0
5/23/2019	47,200	15,340	62,540	0
5/24/2019	60,900	13,050	73,950	0.18
5/25/2019	54,000	13,120	67,120	0.11
5/26/2019	64,000	18,350	82,350	0.68
5/27/2019	64,000	18,350	82,350	2.4
5/28/2019	58,300	13,760	72,060	2.2
5/29/2019	42,900	13,120	56,020	0.14
5/30/2019	50,000	14,160	64,160	0
5/31/2019	50,300	19,170	69,470	0
6/1/2019	76,200	18,130	94,330	0
6/2/2019	92,000	15,000	107,000	0
6/3/2019	98,800	15,730	114,530	0
6/4/2019	96,200	15,730	111,930	0
6/5/2019	102,700	15,870	118,570	0.88
6/6/2019	85,900	20,900	106,800	0.16
6/7/2019	85,900	14,230	100,130	0.69
6/8/2019	81,800	26,850	108,650	0.08
6/9/2019	81,800	26,850	108,650	0.22
6/10/2019	101,000	48,370	149,370	0.23
6/11/2019	57,600	18,050	75,650	0
6/12/2019	58,800	13,570	72,370	0
6/13/2019	73,200	12,180	85,380	0
6/14/2019	60,000	15,410	75,410	1.73
6/15/2019	70,900	17,170	88,070	0.21
6/16/2019	70,900	17,170	88,070	0
6/17/2019	52,000	10,330	62,330	0.08
6/18/2019	68,500	15,270	83,770	0
6/19/2019	60,700	16,240	76,940	0.11
6/20/2019	67,800	12,660	80,460	0
6/21/2019	60,500	14,530	75,030	0.13
6/22/2019	64,350	15,610	79,960	0.35
6/23/2019	64,350	15,610	79,960	0.14
6/24/2019	71,300	16,240	87,540	0
6/25/2019	59,400	13,250	72,650	0

Date	Flow 8A	Flow 8B	Total Flow	Rainfall
6/26/2019	68,600	17,050	85,650	0
6/27/2019	78,800	16,430	95,230	0
6/28/2019	80,500	15,370	95,870	0.6
6/29/2019	81,900	15,560	97,460	0
6/30/2019	81,900	15,560	97,460	0.67
7/1/2019	92,700	27,420	120,120	0.21
7/2/2019	81,900	39,520	121,420	0
7/3/2019	85,700	51,920	137,620	0
7/4/2019	87,100	21,740	108,840	0
7/5/2019	87,100	21,740	108,840	0.15
7/6/2019	90,600	32,460	123,060	0.06
7/7/2019	90,600	23,460	114,060	0.06
7/8/2019	79,800	17,860	97,660	0.06
7/9/2019	85,200	19,010	104,210	0.03
7/10/2019	65,100	17,660	82,760	0
7/11/2019	171,700	15,000	186,700	0.43
7/12/2019	80,800	19,800	100,600	0.05
7/13/2019	65,600	19,810	85,410	1.8
7/14/2019	93,500	20,580	114,080	0
7/15/2019	97,300	23,090	120,390	0
7/16/2019	72,800	15,470	88,270	0
7/17/2019	64,300	18,780	83,080	0
7/18/2019	82,400	18,910	101,310	0
7/19/2019	83,700	19,140	102,840	0.06
7/20/2019	56,800	83,280	140,080	0.15
7/21/2019	56,800	83,280	140,080	0
7/22/2019	82,700	141,260	223,960	0
7/23/2019	69,100	104,480	173,580	0
7/24/2019	76,300	78,600	154,900	0.07
7/25/2019	57,200	18,000	75,200	0
7/26/2019	66,400	18,120	84,520	0
7/27/2019	82,900	19,320	102,220	0
7/28/2019	59,600	19,320	78,920	0.32
7/29/2019	59,600	19,320	78,920	1.22
7/30/2019	67,800	16,710	84,510	0.22
7/31/2019	73,000	18,080	91,080	0
8/1/2019	68,500	19,030	87,530	0
8/2/2019	61,000	16,310	77,310	0.12
8/3/2019	67,350	23,140	90,490	0
8/4/2019	67,350	17,040	84,390	0
8/5/2019	62,600	32,300	94,900	0
8/6/2019	77,500	32,300	109,800	0
8/7/2019	71,500	21,430	92,930	0
8/8/2019	62,700	16,440	79,140	0
8/9/2019	58,800	17,780	76,580	0.2
8/10/2019	69,900	19,840	89,740	0
8/11/2019	69,900	19,840	89,740	0
8/12/2019	64,100	19,530	83,630	0.03
8/13/2019	67,800	19,530	87,330	0
8/14/2019	61,500	18,410	79,910	0
8/15/2019	56,500	13,460	69,960	0
8/16/2019	66,800	14,790	81,590	0
8/17/2019	63,500	16,320	79,820	0
8/18/2019	77,200	21,830	99,030	0
8/19/2019	48,200	10,270	58,470	0
8/20/2019	56,000	11,790	67,790	0
8/21/2019	57,400	13,080	70,480	0.16
8/22/2019	58,000	13,460	71,460	0.1
8/23/2019	29,800	10,560	40,360	0
8/24/2019	63,700	16,090	79,790	0.16

Date	Flow 8A	Flow 8B	Total Flow	Rainfall
8/25/2019	50,600	12,260	62,860	0
8/26/2019	49,300	11,210	60,510	0
8/27/2019	55,000	11,680	66,680	0
8/28/2019	43,700	10,970	54,670	0
8/29/2019	50,100	12,410	62,510	0.61
8/30/2019	54,200	19,380	73,580	0
8/31/2019	57,500	19,240	76,740	0.16
10/1/2019	52,100	17,110	69,210	0
10/2/2019	46,500	10,990	57,490	0
10/3/2019	47,600	12,630	60,230	0
10/4/2019	48,400	13,910	62,310	0
10/5/2019	55,700	15,350	71,050	0
10/6/2019	62,400	20,210	82,610	0
10/7/2019	45,000	12,100	57,100	0
10/8/2019	59,800	13,670	73,470	0
10/9/2019	55,800	13,760	69,560	0.26
10/10/2019	55,000	10,830	65,830	0
10/11/2019	53,700	14,220	67,920	1.59
10/12/2019	61,800	17,390	79,190	0
10/13/2019	61,800	17,390	79,190	0
10/14/2019	64,200	15,870	80,070	0
10/15/2019	57,300	15,870	73,170	0
10/16/2019	51,500	13,690	65,190	0
10/17/2019	54,700	18,280	72,980	0
10/18/2019	50,400	15,250	65,650	0
10/19/2019	61,900	29,240	91,140	0.15
10/20/2019	70,000	13,470	83,470	0.51
10/21/2019	36,800	11,300	48,100	0
10/22/2019	59,700	14,300	74,000	0
10/23/2019	60,000	14,300	74,300	0
10/24/2019	53,200	11,780	64,980	0
10/25/2019	60,300	14,470	74,770	0
10/26/2019	57,850	20,100	77,950	0
10/27/2019	57,850	20,100	77,950	0
10/28/2019	70,900	16,330	87,230	0
10/29/2019	63,700	11,720	75,420	0
10/30/2019	45,000	10,590	55,590	0
10/31/2019	115,300	19,790	135,090	0
11/1/2019	75,300	58,740	134,040	0
11/2/2019	64,000	20,230	84,230	0
11/3/2019	64,000	20,230	84,230	0
11/4/2019	67,500	15,100	82,600	#N/A
11/5/2019	61,700	16,860	78,560	#N/A
11/6/2019	61,300	15,020	76,320	#N/A
11/7/2019	62,300	12,380	74,680	#N/A
11/8/2019	61,800	14,550	76,350	#N/A
11/9/2019	62,300	17,400	79,700	#N/A
11/10/2019		13,350	13,350	#N/A
11/11/2019	63,600	13,350	76,950	#N/A
11/12/2019	52,300	9,510	61,810	#N/A
11/13/2019	47,900	10,500	58,400	#N/A
11/14/2019	44,000	10,240	54,240	#N/A
11/15/2019	41,600	8,900	50,500	#N/A
11/16/2019	54,900	12,270	67,170	#N/A
11/17/2019	44,700	10,890	55,590	#N/A
11/18/2019	39,000	8,630	47,630	#N/A
11/19/2019	49,600	9,550	59,150	#N/A
11/20/2019	39,600	10,900	50,500	#N/A
11/21/2019	40,400	7,510	47,910	#N/A
11/22/2019	39,200	73,900	113,100	#N/A

Date	Flow 8A	Flow 8B	Total Flow	Rainfall
11/23/2019	40,900	16,120	57,020	#N/A
11/24/2019	40,900	16,120	57,020	#N/A
11/25/2019	46,600	11,080	57,680	#N/A
11/26/2019	44,700	10,830	55,530	#N/A
11/27/2019	45,800	10,240	56,040	#N/A
11/28/2019	52,200	14,230	66,430	#N/A
11/29/2019	57,300	16,780	74,080	#N/A
11/30/2019	50,300	16,580	66,880	#N/A
12/1/2019	47,400	35,380	82,780	#N/A
12/2/2019	33,400	14,930	48,330	#N/A
12/3/2019	51,000	9,930	60,930	#N/A
12/4/2019	20,300	10,740	31,040	#N/A
12/5/2019	36,900	14,430	51,330	#N/A
12/6/2019	31,700	6,980	38,680	#N/A
12/7/2019	29,700	9,630	39,330	#N/A
12/8/2019	28,100	12,790	40,890	#N/A
12/9/2019	26,300	8,090	34,390	#N/A
12/10/2019	28,900	8,520	37,420	#N/A
12/11/2019	26,700	7,890	34,590	#N/A
12/12/2019	22,200	7,890	30,090	#N/A
12/13/2019	23,600	9,830	33,430	#N/A
12/14/2019	27,800	17,540	45,340	#N/A
12/15/2019	27,800	17,540	45,340	#N/A
12/16/2019	23,800	11,530	35,330	#N/A
12/17/2019	24,800	11,020	35,820	#N/A
12/18/2019	25,800	9,610	35,410	#N/A
12/19/2019	23,300	8,000	31,300	#N/A
12/20/2019	23,600	7,970	31,570	#N/A
12/21/2019	27,000	7,840	34,840	#N/A
12/22/2019	22,000	7,440	29,440	#N/A
12/23/2019	38,400	18,330	56,730	#N/A
12/24/2019	38,200	26,620	64,820	#N/A
12/25/2019	29,500	11,935	41,435	#N/A
12/26/2019	36,900	11,935	48,835	#N/A
12/27/2019	37,700	13,730	51,430	#N/A
12/28/2019	28,200	11,110	39,310	#N/A
12/29/2019	44,000	15,720	59,720	#N/A
12/30/2019	46,700	19,510	66,210	#N/A
12/31/2019	45,600	17,630	63,230	#N/A



Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
2/19/2020 10:15	0
2/19/2020 10:30	0
2/19/2020 10:45	189.7806892
2/19/2020 11:00	177.9028992
2/19/2020 11:15	193.7399525
2/19/2020 11:30	389.5915121
2/19/2020 11:45	138.8381676
2/19/2020 12:00	48.30301268
2/19/2020 12:15	219.6071396
2/19/2020 12:30	151.2438594
2/19/2020 12:45	86.0479898
2/19/2020 13:00	111.9151769
2/19/2020 13:15	116.6662929
2/19/2020 13:30	37.21707534
2/19/2020 13:45	0.263950889
2/19/2020 14:00	0
2/19/2020 14:15	0
2/19/2020 14:30	0
2/19/2020 14:45	0
2/19/2020 15:00	0
2/19/2020 15:15	0
2/19/2020 15:30	0
2/19/2020 15:45	0
2/19/2020 16:00	0
2/19/2020 16:15	0
2/19/2020 16:30	0
2/19/2020 16:45	0
2/19/2020 17:00	0
2/19/2020 17:15	0
2/19/2020 17:30	0
2/19/2020 17:45	0
2/19/2020 18:00	0
2/19/2020 18:15	0
2/19/2020 18:30	0
2/19/2020 18:45	0
2/19/2020 19:00	22.43582556
2/19/2020 19:15	216.9676307
2/19/2020 19:30	128.280132
2/19/2020 19:45	521.3030057
2/19/2020 20:00	631.1065755

Date and Time	Volume (Gal)
2/19/2020 20:15	1836.306334
2/19/2020 20:30	1096.188042
2/19/2020 20:45	977.4101418
2/19/2020 21:00	801.6188498
2/19/2020 21:15	737.7427346
2/19/2020 21:30	558.7840319
2/19/2020 21:45	501.506689
2/19/2020 22:00	499.3950819
2/19/2020 22:15	553.768965
2/19/2020 22:30	408.5959761
2/19/2020 22:45	426.2806857
2/19/2020 23:00	443.9653952
2/19/2020 23:15	429.4480963
2/19/2020 23:30	421.0016679
2/19/2020 23:45	428.1283419
2/20/2020 0:00	519.1913986
2/20/2020 0:15	440.0061319
2/20/2020 0:30	452.6757746
2/20/2020 0:45	445.8130515
2/20/2020 1:00	422.0574714
2/20/2020 1:15	411.235485
2/20/2020 1:30	415.4586992
2/20/2020 1:45	399.6216459
2/20/2020 2:00	394.8705299
2/20/2020 2:15	366.8917357
2/20/2020 2:30	476.9592564
2/20/2020 2:45	495.9637204
2/20/2020 3:00	481.9743232
2/20/2020 3:15	451.3560201
2/20/2020 3:30	451.8839219
2/20/2020 3:45	442.117739
2/20/2020 4:00	455.5792343
2/20/2020 4:15	450.0362657
2/20/2020 4:30	394.606579
2/20/2020 4:45	405.9564672
2/20/2020 5:00	391.1752174
2/20/2020 5:15	454.2594799
2/20/2020 5:30	426.5446366
2/20/2020 5:45	439.4782301
2/20/2020 6:00	432.3515561

Date and Time	Volume (Gal)
2/20/2020 6:15	395.6623826
2/20/2020 6:30	384.5764452
2/20/2020 6:45	389.855463
2/20/2020 7:00	424.9609312
2/20/2020 7:15	416.2505519
2/20/2020 7:30	423.9051277
2/20/2020 7:45	433.6713106
2/20/2020 8:00	398.5658423
2/20/2020 8:15	310.1422945
2/20/2020 8:30	238.3476527
2/20/2020 8:45	343.9280083
2/20/2020 9:00	242.0429652
2/20/2020 9:15	278.9960896
2/20/2020 9:30	274.5089245
2/20/2020 9:45	336.0094816
2/20/2020 10:00	541.891175
2/20/2020 10:15	520.7751039
2/20/2020 10:30	366.099883
2/20/2020 10:45	319.9084774
2/20/2020 11:00	287.706469
2/20/2020 11:15	430.5038999
2/20/2020 11:30	425.7527839
2/20/2020 11:45	355.2778965
2/20/2020 12:00	196.9073632
2/20/2020 12:15	198.2271176
2/20/2020 12:30	413.611043
2/20/2020 12:45	622.6601471
2/20/2020 13:00	391.1752174
2/20/2020 13:15	389.855463
2/20/2020 13:30	423.113275
2/20/2020 13:45	549.017849
2/20/2020 14:00	456.8989888
2/20/2020 14:15	464.5535646
2/20/2020 14:30	323.339839
2/20/2020 14:45	330.9944148
2/20/2020 15:00	372.1707534
2/20/2020 15:15	369.5312445
2/20/2020 15:30	432.0876052
2/20/2020 15:45	569.8699693
2/20/2020 16:00	496.2276712

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
2/20/2020 16:15	544.266733	2/21/2020 2:15	271.8694156	2/21/2020 12:15	106.6361591
2/20/2020 16:30	528.4296797	2/21/2020 2:30	462.1780066	2/21/2020 12:30	210.3688585
2/20/2020 16:45	530.2773359	2/21/2020 2:45	515.2321352	2/21/2020 12:45	47.24720912
2/20/2020 17:00	547.6980946	2/21/2020 3:00	507.3136086	2/21/2020 13:00	0
2/20/2020 17:15	440.7979846	2/21/2020 3:15	464.0256628	2/21/2020 13:15	0
2/20/2020 17:30	497.0195239	2/21/2020 3:30	433.6713106	2/21/2020 13:30	0
2/20/2020 17:45	442.3816899	2/21/2020 3:45	450.5641675	2/21/2020 13:45	0
2/20/2020 18:00	391.7031192	2/21/2020 4:00	350.7907314	2/21/2020 14:00	0
2/20/2020 18:15	347.095419	2/21/2020 4:15	429.7120472	2/21/2020 14:15	0
2/20/2020 18:30	362.4045705	2/21/2020 4:30	412.0273377	2/21/2020 14:30	0
2/20/2020 18:45	503.0903944	2/21/2020 4:45	407.5401726	2/21/2020 14:45	0
2/20/2020 19:00	520.7751039	2/21/2020 5:00	278.7321387	2/21/2020 15:00	0
2/20/2020 19:15	345.5117136	2/21/2020 5:15	286.1227636	2/21/2020 15:15	0
2/20/2020 19:30	434.4631632	2/21/2020 5:30	289.2901743	2/21/2020 15:30	0
2/20/2020 19:45	447.9246586	2/21/2020 5:45	418.362159	2/21/2020 15:45	0
2/20/2020 20:00	390.9112665	2/21/2020 6:00	456.6350379	2/21/2020 16:00	0
2/20/2020 20:15	411.7633868	2/21/2020 6:15	384.0485434	2/21/2020 16:15	0
2/20/2020 20:30	372.1707534	2/21/2020 6:30	450.3002166	2/21/2020 16:30	0
2/20/2020 20:45	597.8487635	2/21/2020 6:45	398.0379406	2/21/2020 16:45	0
2/20/2020 21:00	441.5898372	2/21/2020 7:00	450.5641675	2/21/2020 17:00	0
2/20/2020 21:15	423.113275	2/21/2020 7:15	391.7031192	2/21/2020 17:15	0
2/20/2020 21:30	387.7438559	2/21/2020 7:30	399.8855968	2/21/2020 17:30	0
2/20/2020 21:45	347.6233208	2/21/2020 7:45	406.2204181	2/21/2020 17:45	0
2/20/2020 22:00	450.0362657	2/21/2020 8:00	338.3850396	2/21/2020 18:00	0
2/20/2020 22:15	444.7572479	2/21/2020 8:15	358.7092581	2/21/2020 18:15	48.83091446
2/20/2020 22:30	181.3342607	2/21/2020 8:30	322.5479863	2/21/2020 18:30	192.6841489
2/20/2020 22:45	377.977673	2/21/2020 8:45	360.5569143	2/21/2020 18:45	187.6690821
2/20/2020 23:00	378.5055748	2/21/2020 9:00	242.8348178	2/21/2020 19:00	189.2527874
2/20/2020 23:15	424.4330294	2/21/2020 9:15	458.2187432	2/21/2020 19:15	258.6718712
2/20/2020 23:30	403.3169583	2/21/2020 9:30	358.4453072	2/21/2020 19:30	310.1422945
2/20/2020 23:45	423.3772259	2/21/2020 9:45	380.6171819	2/21/2020 19:45	381.1450837
2/21/2020 0:00	64.40401691	2/21/2020 10:00	336.2734325	2/21/2020 20:00	506.7857068
2/21/2020 0:15	474.3197475	2/21/2020 10:15	315.4213123	2/21/2020 20:15	446.868855
2/21/2020 0:30	481.9743232	2/21/2020 10:30	234.1244385	2/21/2020 20:30	502.0345908
2/21/2020 0:45	324.6595934	2/21/2020 10:45	197.9631667	2/21/2020 20:45	498.0753275
2/21/2020 1:00	381.1450837	2/21/2020 11:00	111.3872751	2/21/2020 21:00	515.4960861
2/21/2020 1:15	463.7617119	2/21/2020 11:15	125.1127214	2/21/2020 21:15	447.1328059
2/21/2020 1:30	444.2293461	2/21/2020 11:30	78.12946313	2/21/2020 21:30	412.5552394
2/21/2020 1:45	479.5987652	2/21/2020 11:45	53.05412868	2/21/2020 21:45	374.0184097
2/21/2020 2:00	399.357695	2/21/2020 12:00	185.8214258	2/21/2020 22:00	383.5206417

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
2/21/2020 22:15	592.0418439	2/22/2020 8:15	339.7047941	2/22/2020 18:15	449.244413
2/21/2020 22:30	601.2801251	2/22/2020 8:30	320.1724283	2/22/2020 18:30	648.2633833
2/21/2020 22:45	577.524545	2/22/2020 8:45	351.5825841	2/22/2020 18:45	790.7968633
2/21/2020 23:00	448.9804621	2/22/2020 9:00	504.1461979	2/22/2020 19:00	831.7092511
2/21/2020 23:15	519.9832513	2/22/2020 9:15	460.3303503	2/22/2020 19:15	1447.770626
2/21/2020 23:30	354.7499948	2/22/2020 9:30	372.6986552	2/22/2020 19:30	1272.771187
2/21/2020 23:45	376.9218694	2/22/2020 9:45	265.5345943	2/22/2020 19:45	1358.555225
2/22/2020 0:00	354.4860439	2/22/2020 10:00	121.6813598	2/22/2020 20:00	818.5117067
2/22/2020 0:15	319.3805756	2/22/2020 10:15	49.35881624	2/22/2020 20:15	624.2438524
2/22/2020 0:30	214.5920727	2/22/2020 10:30	0	2/22/2020 20:30	505.2020015
2/22/2020 0:45	386.6880523	2/22/2020 10:45	0	2/22/2020 20:45	464.0256628
2/22/2020 1:00	428.3922928	2/22/2020 11:00	0	2/22/2020 21:00	479.8627161
2/22/2020 1:15	462.9698592	2/22/2020 11:15	0	2/22/2020 21:15	607.0870446
2/22/2020 1:30	447.3967568	2/22/2020 11:30	0	2/22/2020 21:30	466.1372699
2/22/2020 1:45	445.2851497	2/22/2020 11:45	0	2/22/2020 21:45	542.1551259
2/22/2020 2:00	315.4213123	2/22/2020 12:00	0	2/22/2020 22:00	455.5792343
2/22/2020 2:15	316.4771159	2/22/2020 12:15	0	2/22/2020 22:15	792.6445195
2/22/2020 2:30	305.1272276	2/22/2020 12:30	0	2/22/2020 22:30	942.0407227
2/22/2020 2:45	296.6807992	2/22/2020 12:45	0	2/22/2020 22:45	765.9854798
2/22/2020 3:00	288.4983216	2/22/2020 13:00	0	2/22/2020 23:00	791.8526669
2/22/2020 3:15	289.0262234	2/22/2020 13:15	0	2/22/2020 23:15	680.4653917
2/22/2020 3:30	290.082027	2/22/2020 13:30	0	2/22/2020 23:30	592.3057948
2/22/2020 3:45	291.9296832	2/22/2020 13:45	0	2/22/2020 23:45	517.0797915
2/22/2020 4:00	289.0262234	2/22/2020 14:00	0	2/23/2020 0:00	517.0797915
2/22/2020 4:15	289.2901743	2/22/2020 14:15	0	2/23/2020 0:15	474.0557966
2/22/2020 4:30	279.7879423	2/22/2020 14:30	0	2/23/2020 0:30	335.4815799
2/22/2020 4:45	277.4123843	2/22/2020 14:45	0	2/23/2020 0:45	396.1902843
2/22/2020 5:00	270.8136121	2/22/2020 15:00	0	2/23/2020 1:00	388.5357085
2/22/2020 5:15	257.0881658	2/22/2020 15:15	0	2/23/2020 1:15	378.5055748
2/22/2020 5:30	259.199773	2/22/2020 15:30	0	2/23/2020 1:30	365.8359321
2/22/2020 5:45	276.3565807	2/22/2020 15:45	0	2/23/2020 1:45	393.5507754
2/22/2020 6:00	259.9916256	2/22/2020 16:00	0	2/23/2020 2:00	395.9263334
2/22/2020 6:15	253.6568043	2/22/2020 16:15	0	2/23/2020 2:15	351.5825841
2/22/2020 6:30	286.3867145	2/22/2020 16:30	0	2/23/2020 2:30	350.7907314
2/22/2020 6:45	239.4034563	2/22/2020 16:45	0	2/23/2020 2:45	315.1573614
2/22/2020 7:00	284.2751074	2/22/2020 17:00	0	2/23/2020 3:00	319.1166248
2/22/2020 7:15	337.3292361	2/22/2020 17:15	0	2/23/2020 3:15	323.339839
2/22/2020 7:30	220.6629432	2/22/2020 17:30	0	2/23/2020 3:30	325.715397
2/22/2020 7:45	326.5072496	2/22/2020 17:45	33.25781201	2/23/2020 3:45	350.5267805
2/22/2020 8:00	337.8571379	2/22/2020 18:00	235.9720947	2/23/2020 4:00	347.095419

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
2/23/2020 4:15	368.475441
2/23/2020 4:30	345.5117136
2/23/2020 4:45	347.8872716
2/23/2020 5:00	358.7092581
2/23/2020 5:15	332.5781201
2/23/2020 5:30	366.8917357
2/23/2020 5:45	359.7650617
2/23/2020 6:00	0
2/23/2020 6:15	241.7790143
2/23/2020 6:30	286.9146163
2/23/2020 6:45	277.1484334
2/23/2020 7:00	274.7728754
2/23/2020 7:15	280.579795
2/23/2020 7:30	271.3415139
2/23/2020 7:45	264.2148398
2/23/2020 8:00	255.7684114
2/23/2020 8:15	256.5602641
2/23/2020 8:30	254.7126078
2/23/2020 8:45	334.4257763
2/23/2020 9:00	381.9369363
2/23/2020 9:15	366.099883
2/23/2020 9:30	335.217629
2/23/2020 9:45	171.3041269
2/23/2020 10:00	60.18080268
2/23/2020 10:15	166.28906
2/23/2020 10:30	5.542968668
2/23/2020 10:45	0
2/23/2020 11:00	0
2/23/2020 11:15	0
2/23/2020 11:30	0
2/23/2020 11:45	0
2/23/2020 12:00	0
2/23/2020 12:15	0
2/23/2020 12:30	0
2/23/2020 12:45	0
2/23/2020 13:00	0
2/23/2020 13:15	0
2/23/2020 13:30	0
2/23/2020 13:45	0
2/23/2020 14:00	0

Date and Time	Volume (Gal)
2/23/2020 14:15	0
2/23/2020 14:30	0
2/23/2020 14:45	0
2/23/2020 15:00	0
2/23/2020 15:15	0
2/23/2020 15:30	0
2/23/2020 15:45	0
2/23/2020 16:00	0
2/23/2020 16:15	0
2/23/2020 16:30	0
2/23/2020 16:45	0
2/23/2020 17:00	0
2/23/2020 17:15	0
2/23/2020 17:30	0
2/23/2020 17:45	0
2/23/2020 18:00	0
2/23/2020 18:15	64.14006602
2/23/2020 18:30	243.3627196
2/23/2020 18:45	153.3554665
2/23/2020 19:00	340.2326959
2/23/2020 19:15	517.8716441
2/23/2020 19:30	584.1233173
2/23/2020 19:45	750.1484264
2/23/2020 20:00	747.5089175
2/23/2020 20:15	856.2566838
2/23/2020 20:30	800.8269971
2/23/2020 20:45	703.4291191
2/23/2020 21:00	755.1634933
2/23/2020 21:15	698.4140522
2/23/2020 21:30	675.4503248
2/23/2020 21:45	740.1182926
2/23/2020 22:00	738.2706364
2/23/2020 22:15	559.8398355
2/23/2020 22:30	530.8052377
2/23/2020 22:45	692.0792309
2/23/2020 23:00	709.2360386
2/23/2020 23:15	608.6707499
2/23/2020 23:30	476.4313546
2/23/2020 23:45	418.6261099
2/24/2020 0:00	345.5117136

Date and Time	Volume (Gal)
2/24/2020 0:15	295.3610447
2/24/2020 0:30	408.3320252
2/24/2020 0:45	569.6060184
2/24/2020 1:00	371.6428517
2/24/2020 1:15	444.493297
2/24/2020 1:30	434.7271141
2/24/2020 1:45	457.1629397
2/24/2020 2:00	442.6456408
2/24/2020 2:15	389.855463
2/24/2020 2:30	253.9207552
2/24/2020 2:45	312.7818034
2/24/2020 3:00	322.0200845
2/24/2020 3:15	333.6339236
2/24/2020 3:30	149.660154
2/24/2020 3:45	153.8833683
2/24/2020 4:00	210.3688585
2/24/2020 4:15	211.6886129
2/24/2020 4:30	219.8710905
2/24/2020 4:45	207.2014478
2/24/2020 5:00	262.6311345
2/24/2020 5:15	221.9826976
2/24/2020 5:30	204.2979881
2/24/2020 5:45	212.7444165
2/24/2020 6:00	210.8967603
2/24/2020 6:15	281.6355985
2/24/2020 6:30	240.7232107
2/24/2020 6:45	346.3035663
2/24/2020 7:00	224.3582556
2/24/2020 7:15	216.7036798
2/24/2020 7:30	178.4308009
2/24/2020 7:45	234.1244385
2/24/2020 8:00	234.6523403
2/24/2020 8:15	270.2857103
2/24/2020 8:30	519.1913986
2/24/2020 8:45	522.6227601
2/24/2020 9:00	326.7712005
2/24/2020 9:15	331.2583656
2/24/2020 9:30	328.090955
2/24/2020 9:45	332.842071
2/24/2020 10:00	449.7723148

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
2/24/2020 10:15	530.013385
2/24/2020 10:30	404.3727619
2/24/2020 10:45	566.1746568
2/24/2020 11:00	501.7706399
2/24/2020 11:15	439.742181
2/24/2020 11:30	353.6941912
2/24/2020 11:45	314.8934105
2/24/2020 12:00	301.4319152
2/24/2020 12:15	378.7695257
2/24/2020 12:30	380.353231
2/24/2020 12:45	481.1824706
2/24/2020 13:00	401.4693021
2/24/2020 13:15	328.3549059
2/24/2020 13:30	320.1724283
2/24/2020 13:45	319.1166248
2/24/2020 14:00	272.1333665
2/24/2020 14:15	195.5876087
2/24/2020 14:30	189.2527874
2/24/2020 14:45	210.8967603
2/24/2020 15:00	160.7460914
2/24/2020 15:15	195.3236578
2/24/2020 15:30	166.8169618
2/24/2020 15:45	16.36495512
2/24/2020 16:00	147.284596
2/24/2020 16:15	144.6450872
2/24/2020 16:30	117.4581456
2/24/2020 16:45	102.9408467
2/24/2020 17:00	137.782364
2/24/2020 17:15	215.6478763
2/24/2020 17:30	232.8046841
2/24/2020 17:45	249.4335901
2/24/2020 18:00	165.2332565
2/24/2020 18:15	183.7098187
2/24/2020 18:30	245.2103758
2/24/2020 18:45	247.5859338
2/24/2020 19:00	183.1819169
2/24/2020 19:15	128.0161811
2/24/2020 19:30	118.5139491
2/24/2020 19:45	114.026784
2/24/2020 20:00	95.02232003

Date and Time	Volume (Gal)
2/24/2020 20:15	15.83705334
2/24/2020 20:30	0
2/24/2020 20:45	89.74330225
2/24/2020 21:00	84.46428447
2/24/2020 21:15	125.6406231
2/24/2020 21:30	152.5636138
2/24/2020 21:45	117.1941947
2/24/2020 22:00	153.6194174
2/24/2020 22:15	128.0161811
2/24/2020 22:30	191.8922963
2/24/2020 22:45	160.4821405
2/24/2020 23:00	181.0703098
2/24/2020 23:15	180.8063589
2/24/2020 23:30	122.4732125
2/24/2020 23:45	208.7851532
2/25/2020 0:00	68.36328024
2/25/2020 0:15	69.4190838
2/25/2020 0:30	182.6540152
2/25/2020 0:45	188.7248856
2/25/2020 1:00	186.3493276
2/25/2020 1:15	96.07812358
2/25/2020 1:30	140.6858238
2/25/2020 1:45	149.9241049
2/25/2020 2:00	87.10379336
2/25/2020 2:15	30.35435223
2/25/2020 2:30	54.9017849
2/25/2020 2:45	14.78124978
2/25/2020 3:00	3.431361556
2/25/2020 3:15	0
2/25/2020 3:30	0
2/25/2020 3:45	0
2/25/2020 4:00	0
2/25/2020 4:15	0
2/25/2020 4:30	0
2/25/2020 4:45	0
2/25/2020 5:00	0
2/25/2020 5:15	0
2/25/2020 5:30	0
2/25/2020 5:45	0
2/25/2020 6:00	0

Date and Time	Volume (Gal)
2/25/2020 6:15	0
2/25/2020 6:30	0
2/25/2020 6:45	0
2/25/2020 7:00	0
2/25/2020 7:15	0
2/25/2020 7:30	0
2/25/2020 7:45	0
2/25/2020 8:00	0
2/25/2020 8:15	0
2/25/2020 8:30	0
2/25/2020 8:45	0
2/25/2020 9:00	0
2/25/2020 9:15	0
2/25/2020 9:30	0
2/25/2020 9:45	0
2/25/2020 10:00	0
2/25/2020 10:15	0
2/25/2020 10:30	0
2/25/2020 10:45	0
2/25/2020 11:00	0
2/25/2020 11:15	0
2/25/2020 11:30	0
2/25/2020 11:45	0
2/25/2020 12:00	0
2/25/2020 12:15	0
2/25/2020 12:30	0
2/25/2020 12:45	0
2/25/2020 13:00	0
2/25/2020 13:15	0
2/25/2020 13:30	0
2/25/2020 13:45	0
2/25/2020 14:00	0
2/25/2020 14:15	0
2/25/2020 14:30	0
2/25/2020 14:45	0
2/25/2020 15:00	0
2/25/2020 15:15	6.862723113
2/25/2020 15:30	150.1880558
2/25/2020 15:45	25.86718712
2/25/2020 16:00	33.5217629

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
2/25/2020 16:15	98.45368158	2/26/2020 2:15	419.4179626	2/26/2020 12:15	156.786828
2/25/2020 16:30	45.3995529	2/26/2020 2:30	596.2650582	2/26/2020 12:30	210.3688585
2/25/2020 16:45	120.3616054	2/26/2020 2:45	232.2767823	2/26/2020 12:45	100.0373869
2/25/2020 17:00	156.2589263	2/26/2020 3:00	391.4391683	2/26/2020 13:00	0
2/25/2020 17:15	112.9709805	2/26/2020 3:15	414.1389448	2/26/2020 13:15	162.5937476
2/25/2020 17:30	109.0117171	2/26/2020 3:30	288.4983216	2/26/2020 13:30	136.7265605
2/25/2020 17:45	183.4458678	2/26/2020 3:45	362.4045705	2/26/2020 13:45	137.5184131
2/25/2020 18:00	121.4174089	2/26/2020 4:00	460.0663995	2/26/2020 14:00	154.9391718
2/25/2020 18:15	148.8683014	2/26/2020 4:15	431.8236543	2/26/2020 14:15	148.0764487
2/25/2020 18:30	144.3811363	2/26/2020 4:30	467.9849261	2/26/2020 14:30	183.4458678
2/25/2020 18:45	14.78124978	2/26/2020 4:45	366.8917357	2/26/2020 14:45	85.78403891
2/25/2020 19:00	165.2332565	2/26/2020 5:00	338.6489905	2/26/2020 15:00	57.54129379
2/25/2020 19:15	119.8337036	2/26/2020 5:15	468.248877	2/26/2020 15:15	44.87165112
2/25/2020 19:30	134.8789043	2/26/2020 5:30	444.493297	2/26/2020 15:30	27.45089245
2/25/2020 19:45	150.9799085	2/26/2020 5:45	391.1752174	2/26/2020 15:45	6.070870446
2/25/2020 20:00	179.2226536	2/26/2020 6:00	401.733253	2/26/2020 16:00	0
2/25/2020 20:15	201.6584792	2/26/2020 6:15	438.1584757	2/26/2020 16:15	0
2/25/2020 20:30	230.693077	2/26/2020 6:30	475.9034528	2/26/2020 16:30	0
2/25/2020 20:45	188.9888365	2/26/2020 6:45	530.013385	2/26/2020 16:45	0
2/25/2020 21:00	280.3158441	2/26/2020 7:00	566.7025586	2/26/2020 17:00	0
2/25/2020 21:15	225.6780101	2/26/2020 7:15	570.397871	2/26/2020 17:15	0
2/25/2020 21:30	236.4999965	2/26/2020 7:30	639.8169548	2/26/2020 17:30	0
2/25/2020 21:45	248.9056883	2/26/2020 7:45	590.4581386	2/26/2020 17:45	0
2/25/2020 22:00	454.2594799	2/26/2020 8:00	645.3599235	2/26/2020 18:00	0
2/25/2020 22:15	358.973209	2/26/2020 8:15	658.8214188	2/26/2020 18:15	0
2/25/2020 22:30	448.1886095	2/26/2020 8:30	447.9246586	2/26/2020 18:30	4.223214223
2/25/2020 22:45	288.2343707	2/26/2020 8:45	706.5965297	2/26/2020 18:45	9.238281114
2/25/2020 23:00	332.5781201	2/26/2020 9:00	621.3403926	2/26/2020 19:00	34.31361556
2/25/2020 23:15	222.5105994	2/26/2020 9:15	533.7086975	2/26/2020 19:15	123.529016
2/25/2020 23:30	229.9012243	2/26/2020 9:30	466.1372699	2/26/2020 19:30	91.32700758
2/25/2020 23:45	436.3108195	2/26/2020 9:45	494.1160641	2/26/2020 19:45	164.7053547
2/26/2020 0:00	465.873319	2/26/2020 10:00	351.846535	2/26/2020 20:00	164.4414038
2/26/2020 0:15	429.1841454	2/26/2020 10:15	376.6579185	2/26/2020 20:15	128.280132
2/26/2020 0:30	262.6311345	2/26/2020 10:30	348.9430752	2/26/2020 20:30	191.8922963
2/26/2020 0:45	289.8180761	2/26/2020 10:45	517.6076933	2/26/2020 20:45	210.1049076
2/26/2020 1:00	384.3124943	2/26/2020 11:00	491.4765552	2/26/2020 21:00	331.7862674
2/26/2020 1:15	339.968745	2/26/2020 11:15	390.6473157	2/26/2020 21:15	343.6640574
2/26/2020 1:30	346.5675172	2/26/2020 11:30	230.693077	2/26/2020 21:30	400.6774494
2/26/2020 1:45	365.3080303	2/26/2020 11:45	142.0055783	2/26/2020 21:45	446.6049041
2/26/2020 2:00	407.8041234	2/26/2020 12:00	188.9888365	2/26/2020 22:00	387.479905

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
2/26/2020 22:15	0
2/26/2020 22:30	655.3900573
2/26/2020 22:45	631.6344773
2/26/2020 23:00	632.9542317
2/26/2020 23:15	855.9927329
2/26/2020 23:30	773.3761047
2/26/2020 23:45	625.5636068
2/27/2020 0:00	634.5379371
2/27/2020 0:15	831.973202
2/27/2020 0:30	784.9899438
2/27/2020 0:45	761.7622655
2/27/2020 1:00	779.9748769
2/27/2020 1:15	727.44865
2/27/2020 1:30	754.8995424
2/27/2020 1:45	641.6646111
2/27/2020 2:00	649.8470886
2/27/2020 2:15	609.1986517
2/27/2020 2:30	606.8230937
2/27/2020 2:45	638.2332495
2/27/2020 3:00	552.1852597
2/27/2020 3:15	563.271197
2/27/2020 3:30	753.3158371
2/27/2020 3:45	706.068628
2/27/2020 4:00	693.3989853
2/27/2020 4:15	664.3643875
2/27/2020 4:30	669.1155035
2/27/2020 4:45	684.688606
2/27/2020 5:00	722.1696322
2/27/2020 5:15	678.0898337
2/27/2020 5:30	694.190838
2/27/2020 5:45	624.5078033
2/27/2020 6:00	670.9631597
2/27/2020 6:15	771.2644975
2/27/2020 6:30	683.3688515
2/27/2020 6:45	612.3660624
2/27/2020 7:00	528.4296797
2/27/2020 7:15	614.2137186
2/27/2020 7:30	522.6227601
2/27/2020 7:45	703.9570209
2/27/2020 8:00	750.4123773

Date and Time	Volume (Gal)
2/27/2020 8:15	320.4363792
2/27/2020 8:30	1127.598198
2/27/2020 8:45	925.4118167
2/27/2020 9:00	814.2884924
2/27/2020 9:15	783.1422875
2/27/2020 9:30	613.4218659
2/27/2020 9:45	844.6428447
2/27/2020 10:00	965.5323518
2/27/2020 10:15	363.1964232
2/27/2020 10:30	765.457578
2/27/2020 10:45	799.2432918
2/27/2020 11:00	918.0211918
2/27/2020 11:15	792.6445195
2/27/2020 11:30	514.7042335
2/27/2020 11:45	519.9832513
2/27/2020 12:00	1054.219851
2/27/2020 12:15	956.5580216
2/27/2020 12:30	920.3967498
2/27/2020 12:45	873.1495407
2/27/2020 13:00	704.4849226
2/27/2020 13:15	546.642291
2/27/2020 13:30	711.8755475
2/27/2020 13:45	610.5184062
2/27/2020 14:00	712.6674002
2/27/2020 14:15	605.5033393
2/27/2020 14:30	393.5507754
2/27/2020 14:45	541.3632733
2/27/2020 15:00	279.2600405
2/27/2020 15:15	179.2226536
2/27/2020 15:30	140.9497747
2/27/2020 15:45	140.6858238
2/27/2020 16:00	183.9737696
2/27/2020 16:15	158.8984352
2/27/2020 16:30	121.6813598
2/27/2020 16:45	197.9631667
2/27/2020 17:00	132.5033463
2/27/2020 17:15	168.4006672
2/27/2020 17:30	170.7762252
2/27/2020 17:45	150.7159576
2/27/2020 18:00	224.6222065

Date and Time	Volume (Gal)
2/27/2020 18:15	300.3761116
2/27/2020 18:30	245.7382776
2/27/2020 18:45	232.5407332
2/27/2020 19:00	322.2840354
2/27/2020 19:15	433.4073597
2/27/2020 19:30	255.7684114
2/27/2020 19:45	228.317519
2/27/2020 20:00	364.7801285
2/27/2020 20:15	632.4263299
2/27/2020 20:30	575.6768888
2/27/2020 20:45	518.9274477
2/27/2020 21:00	561.6874917
2/27/2020 21:15	430.5038999
2/27/2020 21:30	1126.278443
2/27/2020 21:45	668.8515526
2/27/2020 22:00	599.4324688
2/27/2020 22:15	468.5128279
2/27/2020 22:30	416.2505519
2/27/2020 22:45	549.2817999
2/27/2020 23:00	674.9224231
2/27/2020 23:15	715.3069091
2/27/2020 23:30	653.806352
2/27/2020 23:45	739.8543418
2/28/2020 0:00	528.9575815
2/28/2020 0:15	591.777893
2/28/2020 0:30	623.7159506
2/28/2020 0:45	627.1473122
2/28/2020 1:00	777.8632698
2/28/2020 1:15	420.4737661
2/28/2020 1:30	433.9352615
2/28/2020 1:45	413.3470921
2/28/2020 2:00	399.8855968
2/28/2020 2:15	408.0680743
2/28/2020 2:30	386.4241014
2/28/2020 2:45	415.986601
2/28/2020 3:00	415.4586992
2/28/2020 3:15	418.0982081
2/28/2020 3:30	590.1941877
2/28/2020 3:45	592.5697457
2/28/2020 4:00	585.7070226

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
2/28/2020 4:15	590.9860404
2/28/2020 4:30	542.4190768
2/28/2020 4:45	579.6361522
2/28/2020 5:00	558.2561302
2/28/2020 5:15	585.1791208
2/28/2020 5:30	588.6104824
2/28/2020 5:45	604.9754375
2/28/2020 6:00	728.5044535
2/28/2020 6:15	716.0987617
2/28/2020 6:30	680.9932935
2/28/2020 6:45	686.0083604
2/28/2020 7:00	678.0898337
2/28/2020 7:15	639.553004
2/28/2020 7:30	694.9826906
2/28/2020 7:45	665.9480928
2/28/2020 8:00	711.6115966
2/28/2020 8:15	596.2650582
2/28/2020 8:30	550.3376035
2/28/2020 8:45	377.4497712
2/28/2020 9:00	659.3493206
2/28/2020 9:15	544.0027821
2/28/2020 9:30	424.6969803
2/28/2020 9:45	546.3783401
2/28/2020 10:00	530.2773359
2/28/2020 10:15	342.6082539
2/28/2020 10:30	263.950889
2/28/2020 10:45	334.4257763
2/28/2020 11:00	247.0580321
2/28/2020 11:15	536.3482064
2/28/2020 11:30	299.0563572
2/28/2020 11:45	251.0172954
2/28/2020 12:00	238.6116036
2/28/2020 12:15	244.4185232
2/28/2020 12:30	143.0613818
2/28/2020 12:45	0
2/28/2020 13:00	0
2/28/2020 13:15	0
2/28/2020 13:30	0
2/28/2020 13:45	45.92745468
2/28/2020 14:00	33.5217629

Date and Time	Volume (Gal)
2/28/2020 14:15	18.74051312
2/28/2020 14:30	64.6679678
2/28/2020 14:45	104.524552
2/28/2020 15:00	92.64676202
2/28/2020 15:15	53.84598135
2/28/2020 15:30	7.65457578
2/28/2020 15:45	54.10993224
2/28/2020 16:00	0
2/28/2020 16:15	0
2/28/2020 16:30	0
2/28/2020 16:45	4.751116001
2/28/2020 17:00	7.126674002
2/28/2020 17:15	0
2/28/2020 17:30	0.791852667
2/28/2020 17:45	16.628906
2/28/2020 18:00	175.5273412
2/28/2020 18:15	172.3599305
2/28/2020 18:30	169.7204216
2/28/2020 18:45	243.0987687
2/28/2020 19:00	128.0161811
2/28/2020 19:15	321.7561336
2/28/2020 19:30	298.5284554
2/28/2020 19:45	268.4380541
2/28/2020 20:00	173.1517832
2/28/2020 20:15	223.8303538
2/28/2020 20:30	622.3961962
2/28/2020 20:45	525.262269
2/28/2020 21:00	460.0663995
2/28/2020 21:15	450.5641675
2/28/2020 21:30	1089.325319
2/28/2020 21:45	1175.637259
2/28/2020 22:00	1082.198645
2/28/2020 22:15	1016.474873
2/28/2020 22:30	942.0407227
2/28/2020 22:45	833.8208582
2/28/2020 23:00	977.4101418
2/28/2020 23:15	997.9983112
2/28/2020 23:30	1075.335922
2/28/2020 23:45	776.8074662
2/29/2020 0:00	735.8950784

Date and Time	Volume (Gal)
2/29/2020 0:15	753.3158371
2/29/2020 0:30	603.1277813
2/29/2020 0:45	846.22655
2/29/2020 1:00	894.7935136
2/29/2020 1:15	771.2644975
2/29/2020 1:30	758.330904
2/29/2020 1:45	549.2817999
2/29/2020 2:00	527.1099253
2/29/2020 2:15	628.2031157
2/29/2020 2:30	665.684142
2/29/2020 2:45	1005.652887
2/29/2020 3:00	290.082027
2/29/2020 3:15	297.7366027
2/29/2020 3:30	276.6205316
2/29/2020 3:45	781.2946313
2/29/2020 4:00	782.6143858
2/29/2020 4:15	638.2332495
2/29/2020 4:30	619.4927364
2/29/2020 4:45	622.9240979
2/29/2020 5:00	615.7974239
2/29/2020 5:15	615.0055713
2/29/2020 5:30	483.5580286
2/29/2020 5:45	529.2215324
2/29/2020 6:00	475.1116001
2/29/2020 6:15	364.5161777
2/29/2020 6:30	426.5446366
2/29/2020 6:45	456.371087
2/29/2020 7:00	209.5770058
2/29/2020 7:15	401.9972039
2/29/2020 7:30	486.7254392
2/29/2020 7:45	490.4207517
2/29/2020 8:00	492.004457
2/29/2020 8:15	454.2594799
2/29/2020 8:30	556.9363757
2/29/2020 8:45	293.7773394
2/29/2020 9:00	633.4821335
2/29/2020 9:15	496.4916221
2/29/2020 9:30	258.1439694
2/29/2020 9:45	852.5613713
2/29/2020 10:00	623.4519997

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
2/29/2020 10:15	492.5323588
2/29/2020 10:30	818.5117067
2/29/2020 10:45	660.1411733
2/29/2020 11:00	586.2349244
2/29/2020 11:15	565.3828042
2/29/2020 11:30	594.9453037
2/29/2020 11:45	876.3169513
2/29/2020 12:00	924.3560131
2/29/2020 12:15	1051.316391
2/29/2020 12:30	876.8448531
2/29/2020 12:45	736.6869311
2/29/2020 13:00	756.4832478
2/29/2020 13:15	506.257805
2/29/2020 13:30	578.0524468
2/29/2020 13:45	150.1880558
2/29/2020 14:00	244.4185232
2/29/2020 14:15	279.2600405
2/29/2020 14:30	178.16685
2/29/2020 14:45	360.2929634
2/29/2020 15:00	281.3716476
2/29/2020 15:15	381.9369363
2/29/2020 15:30	431.5597034
2/29/2020 15:45	348.9430752
2/29/2020 16:00	500.7148364
2/29/2020 16:15	552.1852597
2/29/2020 16:30	532.388943
2/29/2020 16:45	564.0630497
2/29/2020 17:00	677.2979811
2/29/2020 17:15	528.9575815
2/29/2020 17:30	545.3225366
2/29/2020 17:45	556.144523
2/29/2020 18:00	348.4151734
2/29/2020 18:15	632.9542317
2/29/2020 18:30	640.6088075
2/29/2020 18:45	589.1383842
2/29/2020 19:00	724.0172884
2/29/2020 19:15	842.7951884
2/29/2020 19:30	938.873312
2/29/2020 19:45	1211.006679
2/29/2020 20:00	969.2276643

Date and Time	Volume (Gal)
2/29/2020 20:15	273.7170719
2/29/2020 20:30	423.9051277
2/29/2020 20:45	634.0100353
2/29/2020 21:00	727.1846991
2/29/2020 21:15	773.1121538
2/29/2020 21:30	1045.773422
2/29/2020 21:45	729.0323553
2/29/2020 22:00	713.4592529
2/29/2020 22:15	2581.439694
2/29/2020 22:30	2713.415139
2/29/2020 22:45	2698.369938
2/29/2020 23:00	2118.733786
2/29/2020 23:15	1990.453654
2/29/2020 23:30	1623.034016
2/29/2020 23:45	1456.744956
3/1/2020 0:00	1372.280672
3/1/2020 0:15	1351.428551
3/1/2020 0:30	1554.934687
3/1/2020 0:45	847.2823536
3/1/2020 1:00	592.5697457
3/1/2020 1:15	761.7622655
3/1/2020 1:30	980.8415034
3/1/2020 1:45	763.08202
3/1/2020 2:00	915.6456338
3/1/2020 2:15	950.4871511
3/1/2020 2:30	928.0513256
3/1/2020 2:45	815.344296
3/1/2020 3:00	638.7611513
3/1/2020 3:15	607.0870446
3/1/2020 3:30	673.8666195
3/1/2020 3:45	642.1925128
3/1/2020 4:00	503.6182961
3/1/2020 4:15	398.8297932
3/1/2020 4:30	404.6367128
3/1/2020 4:45	494.9079168
3/1/2020 5:00	472.7360421
3/1/2020 5:15	480.6545688
3/1/2020 5:30	517.6076933
3/1/2020 5:45	505.7299032
3/1/2020 6:00	496.4916221

Date and Time	Volume (Gal)
3/1/2020 6:15	481.4464215
3/1/2020 6:30	452.9397255
3/1/2020 6:45	506.257805
3/1/2020 7:00	471.9441895
3/1/2020 7:15	297.4726519
3/1/2020 7:30	394.3426281
3/1/2020 7:45	639.8169548
3/1/2020 8:00	616.3253257
3/1/2020 8:15	673.0747668
3/1/2020 8:30	440.7979846
3/1/2020 8:45	457.4268906
3/1/2020 9:00	618.4369328
3/1/2020 9:15	654.3342537
3/1/2020 9:30	623.9799015
3/1/2020 9:45	651.430794
3/1/2020 10:00	188.1969838
3/1/2020 10:15	136.1986587
3/1/2020 10:30	124.8487705
3/1/2020 10:45	155.4670736
3/1/2020 11:00	121.9453107
3/1/2020 11:15	292.9854867
3/1/2020 11:30	157.3147298
3/1/2020 11:45	189.5167383
3/1/2020 12:00	173.6796849
3/1/2020 12:15	109.0117171
3/1/2020 12:30	103.4687485
3/1/2020 12:45	0
3/1/2020 13:00	6.070870446
3/1/2020 13:15	30.61830312
3/1/2020 13:30	11.87779
3/1/2020 13:45	2.111607112
3/1/2020 14:00	0
3/1/2020 14:15	0
3/1/2020 14:30	0
3/1/2020 14:45	0
3/1/2020 15:00	0
3/1/2020 15:15	0
3/1/2020 15:30	0
3/1/2020 15:45	0
3/1/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/1/2020 16:15	0	3/2/2020 2:15	0	3/2/2020 12:15	0
3/1/2020 16:30	0	3/2/2020 2:30	0	3/2/2020 12:30	0
3/1/2020 16:45	0	3/2/2020 2:45	0	3/2/2020 12:45	0
3/1/2020 17:00	0	3/2/2020 3:00	0	3/2/2020 13:00	0
3/1/2020 17:15	0	3/2/2020 3:15	0	3/2/2020 13:15	0
3/1/2020 17:30	0	3/2/2020 3:30	0	3/2/2020 13:30	0
3/1/2020 17:45	0	3/2/2020 3:45	0	3/2/2020 13:45	0
3/1/2020 18:00	0	3/2/2020 4:00	0	3/2/2020 14:00	0
3/1/2020 18:15	0	3/2/2020 4:15	0	3/2/2020 14:15	0
3/1/2020 18:30	0	3/2/2020 4:30	0	3/2/2020 14:30	0
3/1/2020 18:45	0	3/2/2020 4:45	0	3/2/2020 14:45	0
3/1/2020 19:00	0	3/2/2020 5:00	0	3/2/2020 15:00	0
3/1/2020 19:15	0	3/2/2020 5:15	0	3/2/2020 15:15	0
3/1/2020 19:30	0	3/2/2020 5:30	0	3/2/2020 15:30	0
3/1/2020 19:45	0	3/2/2020 5:45	0	3/2/2020 15:45	4.487165112
3/1/2020 20:00	4.223214223	3/2/2020 6:00	0	3/2/2020 16:00	0
3/1/2020 20:15	43.81584757	3/2/2020 6:15	0	3/2/2020 16:15	0
3/1/2020 20:30	88.4235478	3/2/2020 6:30	0	3/2/2020 16:30	0
3/1/2020 20:45	96.07812358	3/2/2020 6:45	0	3/2/2020 16:45	0
3/1/2020 21:00	107.1640609	3/2/2020 7:00	0	3/2/2020 17:00	0
3/1/2020 21:15	110.0675207	3/2/2020 7:15	6.070870446	3/2/2020 17:15	0
3/1/2020 21:30	98.98158336	3/2/2020 7:30	0.527901778	3/2/2020 17:30	0
3/1/2020 21:45	151.7717612	3/2/2020 7:45	13.19754445	3/2/2020 17:45	0
3/1/2020 22:00	89.74330225	3/2/2020 8:00	4.751116001	3/2/2020 18:00	0
3/1/2020 22:15	135.406806	3/2/2020 8:15	0	3/2/2020 18:15	0
3/1/2020 22:30	50.94252157	3/2/2020 8:30	32.20200845	3/2/2020 18:30	0
3/1/2020 22:45	159.9542387	3/2/2020 8:45	10.03013378	3/2/2020 18:45	0
3/1/2020 23:00	20.58816934	3/2/2020 9:00	58.33314646	3/2/2020 19:00	0
3/1/2020 23:15	11.61383911	3/2/2020 9:15	85.52008802	3/2/2020 19:15	0
3/1/2020 23:30	37.74497712	3/2/2020 9:30	52.26227601	3/2/2020 19:30	0
3/1/2020 23:45	15.83705334	3/2/2020 9:45	58.06919557	3/2/2020 19:45	0
3/2/2020 0:00	13.72544623	3/2/2020 10:00	0.527901778	3/2/2020 20:00	0
3/2/2020 0:15	32.72991023	3/2/2020 10:15	25.60323623	3/2/2020 20:15	0
3/2/2020 0:30	0	3/2/2020 10:30	59.38895002	3/2/2020 20:30	0
3/2/2020 0:45	0	3/2/2020 10:45	0	3/2/2020 20:45	0
3/2/2020 1:00	0	3/2/2020 11:00	0	3/2/2020 21:00	0
3/2/2020 1:15	0	3/2/2020 11:15	0	3/2/2020 21:15	0
3/2/2020 1:30	0	3/2/2020 11:30	0	3/2/2020 21:30	0
3/2/2020 1:45	0	3/2/2020 11:45	0	3/2/2020 21:45	0
3/2/2020 2:00	0	3/2/2020 12:00	0	3/2/2020 22:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/2/2020 22:15	0	3/3/2020 8:15	0	3/3/2020 18:15	0
3/2/2020 22:30	0	3/3/2020 8:30	0	3/3/2020 18:30	0
3/2/2020 22:45	0	3/3/2020 8:45	0	3/3/2020 18:45	0
3/2/2020 23:00	0	3/3/2020 9:00	0	3/3/2020 19:00	0
3/2/2020 23:15	0	3/3/2020 9:15	0	3/3/2020 19:15	17.68470956
3/2/2020 23:30	0	3/3/2020 9:30	159.6902878	3/3/2020 19:30	147.5485469
3/2/2020 23:45	0	3/3/2020 9:45	0	3/3/2020 19:45	286.6506654
3/3/2020 0:00	0	3/3/2020 10:00	0	3/3/2020 20:00	191.3643945
3/3/2020 0:15	0	3/3/2020 10:15	30.88225401	3/3/2020 20:15	258.6718712
3/3/2020 0:30	0	3/3/2020 10:30	0	3/3/2020 20:30	221.7187467
3/3/2020 0:45	0	3/3/2020 10:45	0	3/3/2020 20:45	268.4380541
3/3/2020 1:00	0	3/3/2020 11:00	0	3/3/2020 21:00	531.5970904
3/3/2020 1:15	0	3/3/2020 11:15	0	3/3/2020 21:15	400.1495477
3/3/2020 1:30	0	3/3/2020 11:30	0	3/3/2020 21:30	497.5474257
3/3/2020 1:45	0	3/3/2020 11:45	45.13560201	3/3/2020 21:45	497.5474257
3/3/2020 2:00	0	3/3/2020 12:00	0	3/3/2020 22:00	459.2745468
3/3/2020 2:15	0	3/3/2020 12:15	0	3/3/2020 22:15	679.6735391
3/3/2020 2:30	0	3/3/2020 12:30	0	3/3/2020 22:30	784.1980911
3/3/2020 2:45	0	3/3/2020 12:45	0	3/3/2020 22:45	706.068628
3/3/2020 3:00	0	3/3/2020 13:00	0	3/3/2020 23:00	696.8303469
3/3/2020 3:15	0	3/3/2020 13:15	0	3/3/2020 23:15	649.8470886
3/3/2020 3:30	0	3/3/2020 13:30	0	3/3/2020 23:30	444.7572479
3/3/2020 3:45	0	3/3/2020 13:45	0	3/3/2020 23:45	701.8454137
3/3/2020 4:00	0	3/3/2020 14:00	0	3/4/2020 0:00	554.0329159
3/3/2020 4:15	0	3/3/2020 14:15	0	3/4/2020 0:15	534.5005501
3/3/2020 4:30	0	3/3/2020 14:30	0	3/4/2020 0:30	540.3074697
3/3/2020 4:45	0	3/3/2020 14:45	0	3/4/2020 0:45	560.895639
3/3/2020 5:00	0	3/3/2020 15:00	0	3/4/2020 1:00	547.9620455
3/3/2020 5:15	0	3/3/2020 15:15	0	3/4/2020 1:15	516.2879388
3/3/2020 5:30	0	3/3/2020 15:30	0	3/4/2020 1:30	434.7271141
3/3/2020 5:45	0	3/3/2020 15:45	0	3/4/2020 1:45	443.7014443
3/3/2020 6:00	0	3/3/2020 16:00	0	3/4/2020 2:00	416.2505519
3/3/2020 6:15	0	3/3/2020 16:15	0	3/4/2020 2:15	422.3214223
3/3/2020 6:30	0	3/3/2020 16:30	0	3/4/2020 2:30	435.5189668
3/3/2020 6:45	0	3/3/2020 16:45	0	3/4/2020 2:45	428.9201946
3/3/2020 7:00	0	3/3/2020 17:00	0	3/4/2020 3:00	405.1646146
3/3/2020 7:15	0	3/3/2020 17:15	0	3/4/2020 3:15	401.2053512
3/3/2020 7:30	0	3/3/2020 17:30	0	3/4/2020 3:30	388.0078068
3/3/2020 7:45	0	3/3/2020 17:45	0	3/4/2020 3:45	371.3789008
3/3/2020 8:00	0	3/3/2020 18:00	0	3/4/2020 4:00	353.9581421

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/4/2020 4:15	488.8370464
3/4/2020 4:30	501.506689
3/4/2020 4:45	475.375551
3/4/2020 5:00	472.4720912
3/4/2020 5:15	391.4391683
3/4/2020 5:30	372.1707534
3/4/2020 5:45	395.1344808
3/4/2020 6:00	406.2204181
3/4/2020 6:15	292.1936341
3/4/2020 6:30	302.4877187
3/4/2020 6:45	267.1182996
3/4/2020 7:00	305.1272276
3/4/2020 7:15	329.1467585
3/4/2020 7:30	325.4514461
3/4/2020 7:45	357.3895037
3/4/2020 8:00	298.7924063
3/4/2020 8:15	347.095419
3/4/2020 8:30	383.7845925
3/4/2020 8:45	397.5100388
3/4/2020 9:00	366.6277848
3/4/2020 9:15	322.0200845
3/4/2020 9:30	544.7946348
3/4/2020 9:45	403.5809092
3/4/2020 10:00	604.4475357
3/4/2020 10:15	489.1009972
3/4/2020 10:30	366.099883
3/4/2020 10:45	366.8917357
3/4/2020 11:00	320.7003301
3/4/2020 11:15	233.3325858
3/4/2020 11:30	268.702005
3/4/2020 11:45	248.6417374
3/4/2020 12:00	192.6841489
3/4/2020 12:15	143.0613818
3/4/2020 12:30	132.2393954
3/4/2020 12:45	164.9693056
3/4/2020 13:00	103.4687485
3/4/2020 13:15	62.82031157
3/4/2020 13:30	7.126674002
3/4/2020 13:45	0
3/4/2020 14:00	0

Date and Time	Volume (Gal)
3/4/2020 14:15	0
3/4/2020 14:30	0
3/4/2020 14:45	0
3/4/2020 15:00	0
3/4/2020 15:15	0
3/4/2020 15:30	0
3/4/2020 15:45	0
3/4/2020 16:00	0
3/4/2020 16:15	0
3/4/2020 16:30	0
3/4/2020 16:45	0
3/4/2020 17:00	0
3/4/2020 17:15	0
3/4/2020 17:30	0
3/4/2020 17:45	0
3/4/2020 18:00	0
3/4/2020 18:15	0
3/4/2020 18:30	0
3/4/2020 18:45	0
3/4/2020 19:00	0
3/4/2020 19:15	0
3/4/2020 19:30	0
3/4/2020 19:45	2.111607112
3/4/2020 20:00	12.40569178
3/4/2020 20:15	86.57589158
3/4/2020 20:30	84.20033358
3/4/2020 20:45	103.9966503
3/4/2020 21:00	165.4972074
3/4/2020 21:15	321.7561336
3/4/2020 21:30	148.8683014
3/4/2020 21:45	234.1244385
3/4/2020 22:00	230.4291261
3/4/2020 22:15	262.8950854
3/4/2020 22:30	271.3415139
3/4/2020 22:45	365.0440794
3/4/2020 23:00	320.1724283
3/4/2020 23:15	300.6400625
3/4/2020 23:30	361.6127179
3/4/2020 23:45	266.326447
3/5/2020 0:00	317.2689685

Date and Time	Volume (Gal)
3/5/2020 0:15	337.8571379
3/5/2020 0:30	201.6584792
3/5/2020 0:45	402.7890566
3/5/2020 1:00	404.6367128
3/5/2020 1:15	459.0105959
3/5/2020 1:30	453.2036763
3/5/2020 1:45	504.1461979
3/5/2020 2:00	489.8928499
3/5/2020 2:15	201.1305774
3/5/2020 2:30	196.1155105
3/5/2020 2:45	202.4503318
3/5/2020 3:00	228.8454207
3/5/2020 3:15	222.2466485
3/5/2020 3:30	223.8303538
3/5/2020 3:45	229.9012243
3/5/2020 4:00	295.0970939
3/5/2020 4:15	266.8543487
3/5/2020 4:30	242.8348178
3/5/2020 4:45	229.1093716
3/5/2020 5:00	301.4319152
3/5/2020 5:15	304.5993259
3/5/2020 5:30	286.6506654
3/5/2020 5:45	300.3761116
3/5/2020 6:00	456.8989888
3/5/2020 6:15	341.5524503
3/5/2020 6:30	359.2371599
3/5/2020 6:45	613.9497677
3/5/2020 7:00	708.7081369
3/5/2020 7:15	681.7851462
3/5/2020 7:30	597.0569108
3/5/2020 7:45	654.0703028
3/5/2020 8:00	1500.560804
3/5/2020 8:15	1339.286811
3/5/2020 8:30	1142.907349
3/5/2020 8:45	1154.785139
3/5/2020 9:00	1012.51561
3/5/2020 9:15	748.0368193
3/5/2020 9:30	475.375551
3/5/2020 9:45	698.4140522
3/5/2020 10:00	516.0239879

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/5/2020 10:15	585.9709735
3/5/2020 10:30	331.2583656
3/5/2020 10:45	77.33761047
3/5/2020 11:00	215.1199745
3/5/2020 11:15	161.537944
3/5/2020 11:30	120.6255563
3/5/2020 11:45	61.50055713
3/5/2020 12:00	58.86104824
3/5/2020 12:15	46.45535646
3/5/2020 12:30	12.66964267
3/5/2020 12:45	4.223214223
3/5/2020 13:00	0.263950889
3/5/2020 13:15	0
3/5/2020 13:30	0
3/5/2020 13:45	0
3/5/2020 14:00	0
3/5/2020 14:15	0
3/5/2020 14:30	0
3/5/2020 14:45	0
3/5/2020 15:00	0
3/5/2020 15:15	0
3/5/2020 15:30	0
3/5/2020 15:45	0
3/5/2020 16:00	9.238281114
3/5/2020 16:15	51.73437424
3/5/2020 16:30	65.72377135
3/5/2020 16:45	53.31807957
3/5/2020 17:00	112.7070296
3/5/2020 17:15	88.4235478
3/5/2020 17:30	108.7477663
3/5/2020 17:45	155.7310245
3/5/2020 18:00	78.12946313
3/5/2020 18:15	15.30915156
3/5/2020 18:30	87.36774425
3/5/2020 18:45	142.53348
3/5/2020 19:00	102.6768958
3/5/2020 19:15	118.2499983
3/5/2020 19:30	154.1473192
3/5/2020 19:45	147.5485469
3/5/2020 20:00	126.1685249

Date and Time	Volume (Gal)
3/5/2020 20:15	304.8632767
3/5/2020 20:30	338.6489905
3/5/2020 20:45	380.8811328
3/5/2020 21:00	766.7773324
3/5/2020 21:15	374.8102623
3/5/2020 21:30	297.208701
3/5/2020 21:45	123.0011143
3/5/2020 22:00	494.1160641
3/5/2020 22:15	702.9012173
3/5/2020 22:30	448.1886095
3/5/2020 22:45	137.782364
3/5/2020 23:00	536.0842555
3/5/2020 23:15	465.6093681
3/5/2020 23:30	467.9849261
3/5/2020 23:45	683.1049006
3/6/2020 0:00	754.1076898
3/6/2020 0:15	819.8314611
3/6/2020 0:30	644.5680708
3/6/2020 0:45	809.5373764
3/6/2020 1:00	803.466506
3/6/2020 1:15	663.308584
3/6/2020 1:30	455.0513326
3/6/2020 1:45	503.3543452
3/6/2020 2:00	490.9486535
3/6/2020 2:15	512.0647246
3/6/2020 2:30	578.0524468
3/6/2020 2:45	554.5608177
3/6/2020 3:00	540.0435188
3/6/2020 3:15	536.3482064
3/6/2020 3:30	511.8007737
3/6/2020 3:45	508.8973139
3/6/2020 4:00	523.1506619
3/6/2020 4:15	515.760037
3/6/2020 4:30	382.9927399
3/6/2020 4:45	385.3682979
3/6/2020 5:00	387.479905
3/6/2020 5:15	403.8448601
3/6/2020 5:30	406.2204181
3/6/2020 5:45	411.4994359
3/6/2020 6:00	232.8046841

Date and Time	Volume (Gal)
3/6/2020 6:15	201.9224301
3/6/2020 6:30	217.2315816
3/6/2020 6:45	201.6584792
3/6/2020 7:00	145.9648416
3/6/2020 7:15	275.828679
3/6/2020 7:30	277.4123843
3/6/2020 7:45	0
3/6/2020 8:00	0
3/6/2020 8:15	331.7862674
3/6/2020 8:30	357.9174054
3/6/2020 8:45	260.5195274
3/6/2020 9:00	174.7354885
3/6/2020 9:15	139.1021185
3/6/2020 9:30	137.782364
3/6/2020 9:45	141.4776765
3/6/2020 10:00	107.4280118
3/6/2020 10:15	14.78124978
3/6/2020 10:30	0
3/6/2020 10:45	0
3/6/2020 11:00	4.223214223
3/6/2020 11:15	2.375558001
3/6/2020 11:30	19.00446401
3/6/2020 11:45	32.99386112
3/6/2020 12:00	0.263950889
3/6/2020 12:15	0
3/6/2020 12:30	0
3/6/2020 12:45	2.375558001
3/6/2020 13:00	1.055803556
3/6/2020 13:15	20.32421845
3/6/2020 13:30	0
3/6/2020 13:45	0
3/6/2020 14:00	3.167410668
3/6/2020 14:15	1.847656223
3/6/2020 14:30	0
3/6/2020 14:45	0
3/6/2020 15:00	0
3/6/2020 15:15	0
3/6/2020 15:30	0
3/6/2020 15:45	54.9017849
3/6/2020 16:00	91.59095847

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/6/2020 16:15	86.83984247	3/7/2020 2:15	641.4006602	3/7/2020 12:15	0
3/6/2020 16:30	111.9151769	3/7/2020 2:30	518.9274477	3/7/2020 12:30	0
3/6/2020 16:45	116.9302438	3/7/2020 2:45	504.1461979	3/7/2020 12:45	0
3/6/2020 17:00	161.537944	3/7/2020 3:00	374.8102623	3/7/2020 13:00	0
3/6/2020 17:15	198.2271176	3/7/2020 3:15	949.9592494	3/7/2020 13:15	0
3/6/2020 17:30	289.5541252	3/7/2020 3:30	891.8900538	3/7/2020 13:30	0
3/6/2020 17:45	366.099883	3/7/2020 3:45	714.2511055	3/7/2020 13:45	0
3/6/2020 18:00	456.6350379	3/7/2020 4:00	653.806352	3/7/2020 14:00	0
3/6/2020 18:15	411.4994359	3/7/2020 4:15	658.0295662	3/7/2020 14:15	0
3/6/2020 18:30	439.4782301	3/7/2020 4:30	418.6261099	3/7/2020 14:30	0
3/6/2020 18:45	455.3152835	3/7/2020 4:45	937.8175085	3/7/2020 14:45	0
3/6/2020 19:00	449.5083639	3/7/2020 5:00	540.5714206	3/7/2020 15:00	0
3/6/2020 19:15	432.3515561	3/7/2020 5:15	728.2405026	3/7/2020 15:15	0
3/6/2020 19:30	780.2388278	3/7/2020 5:30	445.2851497	3/7/2020 15:30	0
3/6/2020 19:45	533.7086975	3/7/2020 5:45	373.7544588	3/7/2020 15:45	0
3/6/2020 20:00	523.4146128	3/7/2020 6:00	440.5340337	3/7/2020 16:00	0
3/6/2020 20:15	577.7884959	3/7/2020 6:15	448.4525603	3/7/2020 16:15	0
3/6/2020 20:30	676.5061284	3/7/2020 6:30	492.7963097	3/7/2020 16:30	0
3/6/2020 20:45	510.4810192	3/7/2020 6:45	649.8470886	3/7/2020 16:45	0
3/6/2020 21:00	419.4179626	3/7/2020 7:00	632.6902808	3/7/2020 17:00	0
3/6/2020 21:15	437.8945248	3/7/2020 7:15	683.6328024	3/7/2020 17:15	0
3/6/2020 21:30	368.2114901	3/7/2020 7:30	657.2377135	3/7/2020 17:30	0
3/6/2020 21:45	446.868855	3/7/2020 7:45	612.6300133	3/7/2020 17:45	0
3/6/2020 22:00	424.4330294	3/7/2020 8:00	796.339832	3/7/2020 18:00	43.55189668
3/6/2020 22:15	448.7165112	3/7/2020 8:15	758.330904	3/7/2020 18:15	139.6300203
3/6/2020 22:30	537.6679608	3/7/2020 8:30	717.946418	3/7/2020 18:30	782.3504349
3/6/2020 22:45	680.2014408	3/7/2020 8:45	450.0362657	3/7/2020 18:45	1128.654001
3/6/2020 23:00	644.5680708	3/7/2020 9:00	808.4815729	3/7/2020 19:00	1625.673525
3/6/2020 23:15	479.5987652	3/7/2020 9:15	687.064164	3/7/2020 19:15	1780.612697
3/6/2020 23:30	840.1556796	3/7/2020 9:30	1274.354892	3/7/2020 19:30	1961.155105
3/6/2020 23:45	917.49329	3/7/2020 9:45	661.4609277	3/7/2020 19:45	1896.487137
3/7/2020 0:00	375.3381641	3/7/2020 10:00	396.1902843	3/7/2020 20:00	1527.219844
3/7/2020 0:15	360.0290125	3/7/2020 10:15	161.8018949	3/7/2020 20:15	1179.860474
3/7/2020 0:30	298.0005536	3/7/2020 10:30	84.72823536	3/7/2020 20:30	1235.29016
3/7/2020 0:45	567.2304604	3/7/2020 10:45	1.847656223	3/7/2020 20:45	1385.742167
3/7/2020 1:00	482.502225	3/7/2020 11:00	0	3/7/2020 21:00	1631.216494
3/7/2020 1:15	450.0362657	3/7/2020 11:15	0	3/7/2020 21:15	1583.705334
3/7/2020 1:30	478.2790108	3/7/2020 11:30	0	3/7/2020 21:30	1656.291828
3/7/2020 1:45	583.3314646	3/7/2020 11:45	0	3/7/2020 21:45	1305.501097
3/7/2020 2:00	691.81528	3/7/2020 12:00	0	3/7/2020 22:00	1378.351542

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/7/2020 22:15	1389.437479
3/7/2020 22:30	1487.363259
3/7/2020 22:45	866.5507685
3/7/2020 23:00	997.2064585
3/7/2020 23:15	905.8794509
3/7/2020 23:30	736.950882
3/7/2020 23:45	964.2125974
3/8/2020 0:00	932.0105889
3/8/2020 0:15	934.122196
3/8/2020 0:30	724.0172884
3/8/2020 0:45	812.968738
3/8/2020 1:00	622.6601471
3/8/2020 1:15	653.5424011
3/8/2020 1:30	640.0809057
3/8/2020 1:45	641.6646111
3/8/2020 2:00	578.5803486
3/8/2020 2:15	643.7762182
3/8/2020 2:30	588.0825806
3/8/2020 2:45	598.3766653
3/8/2020 3:00	792.3805687
3/8/2020 3:15	502.5624926
3/8/2020 3:30	575.6768888
3/8/2020 3:45	857.8403891
3/8/2020 4:00	1026.505007
3/8/2020 4:15	869.4542282
3/8/2020 4:30	821.1512156
3/8/2020 4:45	717.1545653
3/8/2020 5:00	610.2544553
3/8/2020 5:15	613.4218659
3/8/2020 5:30	623.7159506
3/8/2020 5:45	698.6780031
3/8/2020 6:00	797.3956355
3/8/2020 6:15	553.5050141
3/8/2020 6:30	549.5457508
3/8/2020 6:45	546.3783401
3/8/2020 7:00	549.8097017
3/8/2020 7:15	562.2153935
3/8/2020 7:30	592.3057948
3/8/2020 7:45	452.9397255
3/8/2020 8:00	461.122203

Date and Time	Volume (Gal)
3/8/2020 8:15	565.9107059
3/8/2020 8:30	460.3303503
3/8/2020 8:45	553.768965
3/8/2020 9:00	587.026777
3/8/2020 9:15	420.4737661
3/8/2020 9:30	221.7187467
3/8/2020 9:45	431.5597034
3/8/2020 10:00	249.9614918
3/8/2020 10:15	1.055803556
3/8/2020 10:30	0
3/8/2020 10:45	0
3/8/2020 11:00	0
3/8/2020 11:15	0
3/8/2020 11:30	0
3/8/2020 11:45	0
3/8/2020 12:00	0
3/8/2020 12:15	0
3/8/2020 12:30	0
3/8/2020 12:45	0
3/8/2020 13:00	0
3/8/2020 13:15	0
3/8/2020 13:30	0
3/8/2020 13:45	0
3/8/2020 14:00	0
3/8/2020 14:15	0
3/8/2020 14:30	0
3/8/2020 14:45	0
3/8/2020 15:00	0
3/8/2020 15:15	0
3/8/2020 15:30	0
3/8/2020 15:45	0
3/8/2020 16:00	0
3/8/2020 16:15	0
3/8/2020 16:30	0
3/8/2020 16:45	0
3/8/2020 17:00	0
3/8/2020 17:15	0
3/8/2020 17:30	0
3/8/2020 17:45	0
3/8/2020 18:00	0

Date and Time	Volume (Gal)
3/8/2020 18:15	0
3/8/2020 18:30	14.78124978
3/8/2020 18:45	27.18694156
3/8/2020 19:00	40.6484369
3/8/2020 19:15	168.4006672
3/8/2020 19:30	509.9531175
3/8/2020 19:45	664.8922893
3/8/2020 20:00	771.0005467
3/8/2020 20:15	996.1506549
3/8/2020 20:30	1475.74942
3/8/2020 20:45	1547.544062
3/8/2020 21:00	1956.66794
3/8/2020 21:15	1074.544069
3/8/2020 21:30	953.9185127
3/8/2020 21:45	1240.305227
3/8/2020 22:00	724.8091411
3/8/2020 22:15	1061.874426
3/8/2020 22:30	1406.594287
3/8/2020 22:45	921.4525534
3/8/2020 23:00	983.7449632
3/8/2020 23:15	921.9804551
3/8/2020 23:30	814.5524433
3/8/2020 23:45	773.3761047
3/9/2020 0:00	898.488826
3/9/2020 0:15	1134.19697
3/9/2020 0:30	808.4815729
3/9/2020 0:45	649.8470886
3/9/2020 1:00	635.5937406
3/9/2020 1:15	618.4369328
3/9/2020 1:30	633.2181826
3/9/2020 1:45	634.0100353
3/9/2020 2:00	645.3599235
3/9/2020 2:15	640.6088075
3/9/2020 2:30	368.475441
3/9/2020 2:45	372.1707534
3/9/2020 3:00	370.5870481
3/9/2020 3:15	365.8359321
3/9/2020 3:30	386.6880523
3/9/2020 3:45	460.8582521
3/9/2020 4:00	472.2081403

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/9/2020 4:15	442.117739
3/9/2020 4:30	467.4570243
3/9/2020 4:45	457.4268906
3/9/2020 5:00	458.4826941
3/9/2020 5:15	455.3152835
3/9/2020 5:30	446.868855
3/9/2020 5:45	417.0424046
3/9/2020 6:00	419.9458643
3/9/2020 6:15	390.9112665
3/9/2020 6:30	401.4693021
3/9/2020 6:45	394.606579
3/9/2020 7:00	413.8749939
3/9/2020 7:15	287.1785672
3/9/2020 7:30	285.330911
3/9/2020 7:45	280.8437459
3/9/2020 8:00	954.7103654
3/9/2020 8:15	401.4693021
3/9/2020 8:30	402.7890566
3/9/2020 8:45	393.2868246
3/9/2020 9:00	431.2957526
3/9/2020 9:15	162.3297967
3/9/2020 9:30	430.239949
3/9/2020 9:45	3.431361556
3/9/2020 10:00	33.5217629
3/9/2020 10:15	0
3/9/2020 10:30	0
3/9/2020 10:45	0
3/9/2020 11:00	0
3/9/2020 11:15	0
3/9/2020 11:30	0
3/9/2020 11:45	0
3/9/2020 12:00	0
3/9/2020 12:15	0
3/9/2020 12:30	0
3/9/2020 12:45	0
3/9/2020 13:00	0
3/9/2020 13:15	0
3/9/2020 13:30	0
3/9/2020 13:45	0
3/9/2020 14:00	0

Date and Time	Volume (Gal)
3/9/2020 14:15	0
3/9/2020 14:30	0
3/9/2020 14:45	0
3/9/2020 15:00	0
3/9/2020 15:15	0
3/9/2020 15:30	0
3/9/2020 15:45	0
3/9/2020 16:00	0
3/9/2020 16:15	0
3/9/2020 16:30	0
3/9/2020 16:45	0
3/9/2020 17:00	0
3/9/2020 17:15	0
3/9/2020 17:30	0
3/9/2020 17:45	0
3/9/2020 18:00	0
3/9/2020 18:15	0
3/9/2020 18:30	0
3/9/2020 18:45	0
3/9/2020 19:00	0
3/9/2020 19:15	0
3/9/2020 19:30	0
3/9/2020 19:45	0
3/9/2020 20:00	0
3/9/2020 20:15	0
3/9/2020 20:30	0
3/9/2020 20:45	0
3/9/2020 21:00	0
3/9/2020 21:15	0.263950889
3/9/2020 21:30	26.92299067
3/9/2020 21:45	33.25781201
3/9/2020 22:00	72.58649446
3/9/2020 22:15	132.2393954
3/9/2020 22:30	95.5502218
3/9/2020 22:45	145.1729889
3/9/2020 23:00	200.0747738
3/9/2020 23:15	234.9162912
3/9/2020 23:30	0
3/9/2020 23:45	0
3/10/2020 0:00	0

Date and Time	Volume (Gal)
3/10/2020 0:15	0
3/10/2020 0:30	0
3/10/2020 0:45	0
3/10/2020 1:00	0
3/10/2020 1:15	0
3/10/2020 1:30	0
3/10/2020 1:45	0
3/10/2020 2:00	0
3/10/2020 2:15	0
3/10/2020 2:30	0
3/10/2020 2:45	0
3/10/2020 3:00	0
3/10/2020 3:15	0
3/10/2020 3:30	0
3/10/2020 3:45	0
3/10/2020 4:00	0
3/10/2020 4:15	0
3/10/2020 4:30	0
3/10/2020 4:45	0
3/10/2020 5:00	0
3/10/2020 5:15	0
3/10/2020 5:30	0
3/10/2020 5:45	0
3/10/2020 6:00	87.63169513
3/10/2020 6:15	120.8895071
3/10/2020 6:30	148.0764487
3/10/2020 6:45	33.78571379
3/10/2020 7:00	29.56249956
3/10/2020 7:15	76.80970869
3/10/2020 7:30	141.4776765
3/10/2020 7:45	139.8939711
3/10/2020 8:00	140.157922
3/10/2020 8:15	57.80524468
3/10/2020 8:30	144.3811363
3/10/2020 8:45	0
3/10/2020 9:00	0
3/10/2020 9:15	146.4927434
3/10/2020 9:30	77.86551224
3/10/2020 9:45	35.63337001
3/10/2020 10:00	10.55803556

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/10/2020 10:15	0.263950889
3/10/2020 10:30	0
3/10/2020 10:45	0
3/10/2020 11:00	0
3/10/2020 11:15	0
3/10/2020 11:30	0
3/10/2020 11:45	0
3/10/2020 12:00	0
3/10/2020 12:15	0
3/10/2020 12:30	0
3/10/2020 12:45	0
3/10/2020 13:00	0
3/10/2020 13:15	0
3/10/2020 13:30	0
3/10/2020 13:45	0
3/10/2020 14:00	0
3/10/2020 14:15	0
3/10/2020 14:30	0
3/10/2020 14:45	0
3/10/2020 15:00	0
3/10/2020 15:15	0
3/10/2020 15:30	0
3/10/2020 15:45	0
3/10/2020 16:00	0
3/10/2020 16:15	0
3/10/2020 16:30	0
3/10/2020 16:45	0
3/10/2020 17:00	0
3/10/2020 17:15	0
3/10/2020 17:30	0
3/10/2020 17:45	0
3/10/2020 18:00	0
3/10/2020 18:15	0
3/10/2020 18:30	0
3/10/2020 18:45	0
3/10/2020 19:00	0
3/10/2020 19:15	0
3/10/2020 19:30	0
3/10/2020 19:45	0
3/10/2020 20:00	0

Date and Time	Volume (Gal)
3/10/2020 20:15	0
3/10/2020 20:30	0
3/10/2020 20:45	11.34988823
3/10/2020 21:00	144.6450872
3/10/2020 21:15	114.2907349
3/10/2020 21:30	139.8939711
3/10/2020 21:45	155.9949754
3/10/2020 22:00	0
3/10/2020 22:15	0
3/10/2020 22:30	0
3/10/2020 22:45	0
3/10/2020 23:00	0
3/10/2020 23:15	0
3/10/2020 23:30	0
3/10/2020 23:45	0
3/11/2020 0:00	0
3/11/2020 0:15	0
3/11/2020 0:30	0
3/11/2020 0:45	294.0412903
3/11/2020 1:00	0
3/11/2020 1:15	0
3/11/2020 1:30	0
3/11/2020 1:45	0
3/11/2020 2:00	0
3/11/2020 2:15	0
3/11/2020 2:30	0
3/11/2020 2:45	0
3/11/2020 3:00	0
3/11/2020 3:15	0
3/11/2020 3:30	0
3/11/2020 3:45	0
3/11/2020 4:00	0
3/11/2020 4:15	0
3/11/2020 4:30	0
3/11/2020 4:45	0
3/11/2020 5:00	0
3/11/2020 5:15	0
3/11/2020 5:30	0
3/11/2020 5:45	0
3/11/2020 6:00	0

Date and Time	Volume (Gal)
3/11/2020 6:15	0
3/11/2020 6:30	0
3/11/2020 6:45	0
3/11/2020 7:00	0
3/11/2020 7:15	0
3/11/2020 7:30	0
3/11/2020 7:45	215.3839254
3/11/2020 8:00	222.5105994
3/11/2020 8:15	180.2784572
3/11/2020 8:30	210.8967603
3/11/2020 8:45	0
3/11/2020 9:00	0
3/11/2020 9:15	0
3/11/2020 9:30	0
3/11/2020 9:45	44.60770023
3/11/2020 10:00	0
3/11/2020 10:15	0
3/11/2020 10:30	0
3/11/2020 10:45	0
3/11/2020 11:00	0
3/11/2020 11:15	0
3/11/2020 11:30	0
3/11/2020 11:45	0
3/11/2020 12:00	0
3/11/2020 12:15	0
3/11/2020 12:30	0
3/11/2020 12:45	0
3/11/2020 13:00	0
3/11/2020 13:15	0
3/11/2020 13:30	0
3/11/2020 13:45	0
3/11/2020 14:00	0
3/11/2020 14:15	0
3/11/2020 14:30	0
3/11/2020 14:45	0
3/11/2020 15:00	0
3/11/2020 15:15	0
3/11/2020 15:30	0
3/11/2020 15:45	0
3/11/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/11/2020 16:15	0	3/12/2020 2:15	419.6819134	3/12/2020 12:15	0
3/11/2020 16:30	0	3/12/2020 2:30	426.2806857	3/12/2020 12:30	0
3/11/2020 16:45	0	3/12/2020 2:45	414.1389448	3/12/2020 12:45	0
3/11/2020 17:00	0	3/12/2020 3:00	283.2193039	3/12/2020 13:00	0
3/11/2020 17:15	0	3/12/2020 3:15	284.5390583	3/12/2020 13:15	0
3/11/2020 17:30	0	3/12/2020 3:30	284.5390583	3/12/2020 13:30	0
3/11/2020 17:45	0	3/12/2020 3:45	279.7879423	3/12/2020 13:45	0
3/11/2020 18:00	0	3/12/2020 4:00	278.7321387	3/12/2020 14:00	0
3/11/2020 18:15	0	3/12/2020 4:15	275.5647281	3/12/2020 14:15	0
3/11/2020 18:30	0	3/12/2020 4:30	0	3/12/2020 14:30	0
3/11/2020 18:45	0	3/12/2020 4:45	0	3/12/2020 14:45	0
3/11/2020 19:00	0	3/12/2020 5:00	0	3/12/2020 15:00	0
3/11/2020 19:15	0	3/12/2020 5:15	0	3/12/2020 15:15	0
3/11/2020 19:30	0	3/12/2020 5:30	0	3/12/2020 15:30	0
3/11/2020 19:45	0	3/12/2020 5:45	374.2823605	3/12/2020 15:45	0
3/11/2020 20:00	0	3/12/2020 6:00	362.4045705	3/12/2020 16:00	0
3/11/2020 20:15	0.791852667	3/12/2020 6:15	454.7873817	3/12/2020 16:15	0
3/11/2020 20:30	61.76450802	3/12/2020 6:30	429.7120472	3/12/2020 16:30	0
3/11/2020 20:45	0	3/12/2020 6:45	356.597651	3/12/2020 16:45	0
3/11/2020 21:00	0	3/12/2020 7:00	346.8314681	3/12/2020 17:00	0
3/11/2020 21:15	24.81138356	3/12/2020 7:15	347.6233208	3/12/2020 17:15	0
3/11/2020 21:30	85.52008802	3/12/2020 7:30	268.9659559	3/12/2020 17:30	0
3/11/2020 21:45	81.03292291	3/12/2020 7:45	363.4603741	3/12/2020 17:45	0
3/11/2020 22:00	80.76897202	3/12/2020 8:00	0	3/12/2020 18:00	0
3/11/2020 22:15	0	3/12/2020 8:15	0	3/12/2020 18:15	0
3/11/2020 22:30	0	3/12/2020 8:30	0	3/12/2020 18:30	0
3/11/2020 22:45	0	3/12/2020 8:45	0	3/12/2020 18:45	0
3/11/2020 23:00	0	3/12/2020 9:00	0	3/12/2020 19:00	0
3/11/2020 23:15	0	3/12/2020 9:15	0	3/12/2020 19:15	0
3/11/2020 23:30	0	3/12/2020 9:30	0	3/12/2020 19:30	0
3/11/2020 23:45	0	3/12/2020 9:45	0	3/12/2020 19:45	0
3/12/2020 0:00	0	3/12/2020 10:00	0	3/12/2020 20:00	0
3/12/2020 0:15	0	3/12/2020 10:15	0	3/12/2020 20:15	0
3/12/2020 0:30	0	3/12/2020 10:30	0	3/12/2020 20:30	0
3/12/2020 0:45	315.6852632	3/12/2020 10:45	0	3/12/2020 20:45	0
3/12/2020 1:00	331.5223165	3/12/2020 11:00	0	3/12/2020 21:00	0
3/12/2020 1:15	362.9324723	3/12/2020 11:15	0	3/12/2020 21:15	0
3/12/2020 1:30	382.2008872	3/12/2020 11:30	0	3/12/2020 21:30	0
3/12/2020 1:45	398.3018914	3/12/2020 11:45	0	3/12/2020 21:45	0
3/12/2020 2:00	408.859927	3/12/2020 12:00	0	3/12/2020 22:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/12/2020 22:15	0
3/12/2020 22:30	0
3/12/2020 22:45	0
3/12/2020 23:00	0
3/12/2020 23:15	0
3/12/2020 23:30	0
3/12/2020 23:45	0
3/13/2020 0:00	0
3/13/2020 0:15	0
3/13/2020 0:30	0
3/13/2020 0:45	0
3/13/2020 1:00	0
3/13/2020 1:15	0
3/13/2020 1:30	0
3/13/2020 1:45	0
3/13/2020 2:00	0
3/13/2020 2:15	0
3/13/2020 2:30	0
3/13/2020 2:45	0
3/13/2020 3:00	0
3/13/2020 3:15	0
3/13/2020 3:30	0
3/13/2020 3:45	0
3/13/2020 4:00	0
3/13/2020 4:15	0
3/13/2020 4:30	0
3/13/2020 4:45	0
3/13/2020 5:00	0
3/13/2020 5:15	0
3/13/2020 5:30	0
3/13/2020 5:45	0
3/13/2020 6:00	0
3/13/2020 6:15	0
3/13/2020 6:30	0
3/13/2020 6:45	0
3/13/2020 7:00	0
3/13/2020 7:15	0
3/13/2020 7:30	0
3/13/2020 7:45	0
3/13/2020 8:00	0

Date and Time	Volume (Gal)
3/13/2020 8:15	0
3/13/2020 8:30	0
3/13/2020 8:45	0
3/13/2020 9:00	0
3/13/2020 9:15	0
3/13/2020 9:30	0
3/13/2020 9:45	0
3/13/2020 10:00	0
3/13/2020 10:15	0
3/13/2020 10:30	0
3/13/2020 10:45	0
3/13/2020 11:00	0
3/13/2020 11:15	0
3/13/2020 11:30	0
3/13/2020 11:45	0
3/13/2020 12:00	0
3/13/2020 12:15	0
3/13/2020 12:30	0
3/13/2020 12:45	0
3/13/2020 13:00	0
3/13/2020 13:15	0
3/13/2020 13:30	0
3/13/2020 13:45	0
3/13/2020 14:00	0
3/13/2020 14:15	0
3/13/2020 14:30	0
3/13/2020 14:45	0
3/13/2020 15:00	0
3/13/2020 15:15	0
3/13/2020 15:30	0
3/13/2020 15:45	0
3/13/2020 16:00	0
3/13/2020 16:15	0
3/13/2020 16:30	0
3/13/2020 16:45	0
3/13/2020 17:00	0
3/13/2020 17:15	0
3/13/2020 17:30	0
3/13/2020 17:45	0
3/13/2020 18:00	0

Date and Time	Volume (Gal)
3/13/2020 18:15	0
3/13/2020 18:30	0
3/13/2020 18:45	0
3/13/2020 19:00	0
3/13/2020 19:15	0
3/13/2020 19:30	0
3/13/2020 19:45	0
3/13/2020 20:00	0
3/13/2020 20:15	0
3/13/2020 20:30	0
3/13/2020 20:45	13.98939711
3/13/2020 21:00	2.111607112
3/13/2020 21:15	130.65569
3/13/2020 21:30	155.9949754
3/13/2020 21:45	155.9949754
3/13/2020 22:00	98.18973069
3/13/2020 22:15	116.1383911
3/13/2020 22:30	138.3102658
3/13/2020 22:45	90.7991058
3/13/2020 23:00	115.6104894
3/13/2020 23:15	0
3/13/2020 23:30	127.2243285
3/13/2020 23:45	137.2544623
3/14/2020 0:00	108.7477663
3/14/2020 0:15	127.4882794
3/14/2020 0:30	175.2633903
3/14/2020 0:45	0
3/14/2020 1:00	0
3/14/2020 1:15	0
3/14/2020 1:30	0
3/14/2020 1:45	0
3/14/2020 2:00	0
3/14/2020 2:15	0
3/14/2020 2:30	0
3/14/2020 2:45	0
3/14/2020 3:00	0
3/14/2020 3:15	330.2025621
3/14/2020 3:30	332.842071
3/14/2020 3:45	340.7605976
3/14/2020 4:00	315.6852632

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/14/2020 4:15	320.7003301
3/14/2020 4:30	324.3956425
3/14/2020 4:45	335.217629
3/14/2020 5:00	351.0546823
3/14/2020 5:15	367.1556865
3/14/2020 5:30	380.8811328
3/14/2020 5:45	397.2460879
3/14/2020 6:00	0
3/14/2020 6:15	0
3/14/2020 6:30	0
3/14/2020 6:45	0
3/14/2020 7:00	678.8816864
3/14/2020 7:15	623.7159506
3/14/2020 7:30	0
3/14/2020 7:45	0
3/14/2020 8:00	0
3/14/2020 8:15	484.0859304
3/14/2020 8:30	839.3638269
3/14/2020 8:45	789.4771089
3/14/2020 9:00	732.9916186
3/14/2020 9:15	683.8967533
3/14/2020 9:30	515.2321352
3/14/2020 9:45	401.2053512
3/14/2020 10:00	539.515617
3/14/2020 10:15	442.6456408
3/14/2020 10:30	366.8917357
3/14/2020 10:45	443.7014443
3/14/2020 11:00	345.5117136
3/14/2020 11:15	239.4034563
3/14/2020 11:30	314.6294596
3/14/2020 11:45	250.7533445
3/14/2020 12:00	196.3794614
3/14/2020 12:15	152.035712
3/14/2020 12:30	145.9648416
3/14/2020 12:45	160.2181896
3/14/2020 13:00	151.5078103
3/14/2020 13:15	129.3359356
3/14/2020 13:30	28.24274512
3/14/2020 13:45	0
3/14/2020 14:00	0

Date and Time	Volume (Gal)
3/14/2020 14:15	0
3/14/2020 14:30	0
3/14/2020 14:45	0
3/14/2020 15:00	0
3/14/2020 15:15	0
3/14/2020 15:30	0
3/14/2020 15:45	0
3/14/2020 16:00	0
3/14/2020 16:15	0
3/14/2020 16:30	0
3/14/2020 16:45	0
3/14/2020 17:00	0
3/14/2020 17:15	0
3/14/2020 17:30	0
3/14/2020 17:45	0
3/14/2020 18:00	24.54743267
3/14/2020 18:15	0
3/14/2020 18:30	0
3/14/2020 18:45	0
3/14/2020 19:00	0
3/14/2020 19:15	0
3/14/2020 19:30	1.055803556
3/14/2020 19:45	14.78124978
3/14/2020 20:00	35.36941912
3/14/2020 20:15	62.55636068
3/14/2020 20:30	125.904574
3/14/2020 20:45	187.4051312
3/14/2020 21:00	248.3777865
3/14/2020 21:15	160.7460914
3/14/2020 21:30	346.8314681
3/14/2020 21:45	667.7957491
3/14/2020 22:00	428.3922928
3/14/2020 22:15	339.7047941
3/14/2020 22:30	501.2427381
3/14/2020 22:45	251.8091481
3/14/2020 23:00	301.959817
3/14/2020 23:15	810.0652782
3/14/2020 23:30	251.8091481
3/14/2020 23:45	331.5223165
3/15/2020 0:00	356.597651

Date and Time	Volume (Gal)
3/15/2020 0:15	187.6690821
3/15/2020 0:30	198.7550194
3/15/2020 0:45	233.8604876
3/15/2020 1:00	198.4910685
3/15/2020 1:15	175.5273412
3/15/2020 1:30	210.1049076
3/15/2020 1:45	221.1908449
3/15/2020 2:00	286.3867145
3/15/2020 2:15	196.9073632
3/15/2020 2:30	246.7940812
3/15/2020 2:45	224.8861574
3/15/2020 3:00	212.4804656
3/15/2020 3:15	186.0853767
3/15/2020 3:30	204.5619389
3/15/2020 3:45	184.2377205
3/15/2020 4:00	174.4715376
3/15/2020 4:15	191.8922963
3/15/2020 4:30	206.4095952
3/15/2020 4:45	220.3989923
3/15/2020 5:00	185.293524
3/15/2020 5:15	153.0915156
3/15/2020 5:30	541.3632733
3/15/2020 5:45	495.1718677
3/15/2020 6:00	604.7114866
3/15/2020 6:15	434.7271141
3/15/2020 6:30	425.7527839
3/15/2020 6:45	499.131131
3/15/2020 7:00	565.3828042
3/15/2020 7:15	522.886711
3/15/2020 7:30	526.0541217
3/15/2020 7:45	723.7533375
3/15/2020 8:00	261.0474292
3/15/2020 8:15	372.1707534
3/15/2020 8:30	333.3699728
3/15/2020 8:45	434.1992123
3/15/2020 9:00	1118.623867
3/15/2020 9:15	563.7990988
3/15/2020 9:30	794.4921758
3/15/2020 9:45	366.6277848
3/15/2020 10:00	297.7366027

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/15/2020 10:15	334.4257763
3/15/2020 10:30	457.1629397
3/15/2020 10:45	584.9151699
3/15/2020 11:00	472.999993
3/15/2020 11:15	324.1316916
3/15/2020 11:30	284.2751074
3/15/2020 11:45	254.1847061
3/15/2020 12:00	238.0837018
3/15/2020 12:15	234.6523403
3/15/2020 12:30	199.8108229
3/15/2020 12:45	157.5786807
3/15/2020 13:00	154.6752209
3/15/2020 13:15	109.5396189
3/15/2020 13:30	79.97711935
3/15/2020 13:45	13.72544623
3/15/2020 14:00	0
3/15/2020 14:15	0
3/15/2020 14:30	0
3/15/2020 14:45	0
3/15/2020 15:00	0
3/15/2020 15:15	0
3/15/2020 15:30	0
3/15/2020 15:45	0
3/15/2020 16:00	0
3/15/2020 16:15	0
3/15/2020 16:30	0
3/15/2020 16:45	0
3/15/2020 17:00	0
3/15/2020 17:15	0
3/15/2020 17:30	0
3/15/2020 17:45	0
3/15/2020 18:00	0
3/15/2020 18:15	0
3/15/2020 18:30	0
3/15/2020 18:45	0
3/15/2020 19:00	0
3/15/2020 19:15	0
3/15/2020 19:30	0
3/15/2020 19:45	0
3/15/2020 20:00	3.695312445

Date and Time	Volume (Gal)
3/15/2020 20:15	40.6484369
3/15/2020 20:30	62.55636068
3/15/2020 20:45	88.4235478
3/15/2020 21:00	214.3281218
3/15/2020 21:15	200.0747738
3/15/2020 21:30	256.2963132
3/15/2020 21:45	309.3504419
3/15/2020 22:00	361.8766688
3/15/2020 22:15	240.7232107
3/15/2020 22:30	481.9743232
3/15/2020 22:45	260.2555765
3/15/2020 23:00	402.2611548
3/15/2020 23:15	336.0094816
3/15/2020 23:30	319.9084774
3/15/2020 23:45	351.5825841
3/16/2020 0:00	239.1395054
3/16/2020 0:15	274.5089245
3/16/2020 0:30	320.1724283
3/16/2020 0:45	319.9084774
3/16/2020 1:00	324.6595934
3/16/2020 1:15	317.0050176
3/16/2020 1:30	471.9441895
3/16/2020 1:45	405.6925163
3/16/2020 2:00	333.3699728
3/16/2020 2:15	324.3956425
3/16/2020 2:30	324.9235443
3/16/2020 2:45	326.5072496
3/16/2020 3:00	319.1166248
3/16/2020 3:15	315.1573614
3/16/2020 3:30	309.3504419
3/16/2020 3:45	310.9341472
3/16/2020 4:00	299.0563572
3/16/2020 4:15	302.4877187
3/16/2020 4:30	265.5345943
3/16/2020 4:45	277.6763352
3/16/2020 5:00	278.4681879
3/16/2020 5:15	282.955353
3/16/2020 5:30	280.8437459
3/16/2020 5:45	293.2494376
3/16/2020 6:00	340.7605976

Date and Time	Volume (Gal)
3/16/2020 6:15	348.4151734
3/16/2020 6:30	344.1919592
3/16/2020 6:45	333.6339236
3/16/2020 7:00	265.0066925
3/16/2020 7:15	301.6958661
3/16/2020 7:30	330.2025621
3/16/2020 7:45	429.4480963
3/16/2020 8:00	445.0211988
3/16/2020 8:15	450.3002166
3/16/2020 8:30	436.3108195
3/16/2020 8:45	430.7678508
3/16/2020 9:00	457.9547923
3/16/2020 9:15	433.4073597
3/16/2020 9:30	415.7226501
3/16/2020 9:45	395.9263334
3/16/2020 10:00	384.0485434
3/16/2020 10:15	371.1149499
3/16/2020 10:30	237.2918492
3/16/2020 10:45	0
3/16/2020 11:00	342.0803521
3/16/2020 11:15	318.8526739
3/16/2020 11:30	338.6489905
3/16/2020 11:45	280.8437459
3/16/2020 12:00	305.6551294
3/16/2020 12:15	303.0156205
3/16/2020 12:30	297.4726519
3/16/2020 12:45	303.8074732
3/16/2020 13:00	220.9268941
3/16/2020 13:15	214.0641709
3/16/2020 13:30	234.9162912
3/16/2020 13:45	206.9374969
3/16/2020 14:00	204.2979881
3/16/2020 14:15	162.3297967
3/16/2020 14:30	131.4475427
3/16/2020 14:45	96.07812358
3/16/2020 15:00	61.76450802
3/16/2020 15:15	93.43861469
3/16/2020 15:30	65.72377135
3/16/2020 15:45	7.65457578
3/16/2020 16:00	3.167410668

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/16/2020 16:15	0	3/17/2020 2:15	195.8515596	3/17/2020 12:15	77.86551224
3/16/2020 16:30	0	3/17/2020 2:30	165.2332565	3/17/2020 12:30	115.3465385
3/16/2020 16:45	0	3/17/2020 2:45	163.913502	3/17/2020 12:45	3.959263334
3/16/2020 17:00	0	3/17/2020 3:00	171.5680778	3/17/2020 13:00	0
3/16/2020 17:15	0	3/17/2020 3:15	139.6300203	3/17/2020 13:15	0
3/16/2020 17:30	0	3/17/2020 3:30	92.91071291	3/17/2020 13:30	0
3/16/2020 17:45	0	3/17/2020 3:45	86.0479898	3/17/2020 13:45	0
3/16/2020 18:00	0	3/17/2020 4:00	47.7751109	3/17/2020 14:00	0
3/16/2020 18:15	0	3/17/2020 4:15	44.60770023	3/17/2020 14:15	0
3/16/2020 18:30	0	3/17/2020 4:30	27.45089245	3/17/2020 14:30	0
3/16/2020 18:45	0	3/17/2020 4:45	48.03906179	3/17/2020 14:45	0
3/16/2020 19:00	0	3/17/2020 5:00	60.44475357	3/17/2020 15:00	0
3/16/2020 19:15	0.791852667	3/17/2020 5:15	67.0435258	3/17/2020 15:15	0
3/16/2020 19:30	4.223214223	3/17/2020 5:30	47.51116001	3/17/2020 15:30	0
3/16/2020 19:45	10.29408467	3/17/2020 5:45	34.04966468	3/17/2020 15:45	0
3/16/2020 20:00	1.055803556	3/17/2020 6:00	26.92299067	3/17/2020 16:00	0
3/16/2020 20:15	15.30915156	3/17/2020 6:15	11.87779	3/17/2020 16:15	0
3/16/2020 20:30	65.98772224	3/17/2020 6:30	11.08593734	3/17/2020 16:30	0
3/16/2020 20:45	79.71316847	3/17/2020 6:45	0.263950889	3/17/2020 16:45	0
3/16/2020 21:00	126.4324758	3/17/2020 7:00	15.57310245	3/17/2020 17:00	0
3/16/2020 21:15	83.14453002	3/17/2020 7:15	3.167410668	3/17/2020 17:15	0
3/16/2020 21:30	60.70870446	3/17/2020 7:30	1.583705334	3/17/2020 17:30	0
3/16/2020 21:45	139.1021185	3/17/2020 7:45	15.57310245	3/17/2020 17:45	0
3/16/2020 22:00	41.17633868	3/17/2020 8:00	28.7706469	3/17/2020 18:00	0
3/16/2020 22:15	97.9257798	3/17/2020 8:15	32.72991023	3/17/2020 18:15	0
3/16/2020 22:30	120.3616054	3/17/2020 8:30	34.57756645	3/17/2020 18:30	0
3/16/2020 22:45	138.5742167	3/17/2020 8:45	51.47042335	3/17/2020 18:45	0
3/16/2020 23:00	142.0055783	3/17/2020 9:00	45.13560201	3/17/2020 19:00	0
3/16/2020 23:15	144.6450872	3/17/2020 9:15	14.253348	3/17/2020 19:15	0
3/16/2020 23:30	131.7114936	3/17/2020 9:30	21.38002201	3/17/2020 19:30	0
3/16/2020 23:45	131.4475427	3/17/2020 9:45	24.28348178	3/17/2020 19:45	0
3/17/2020 0:00	105.3164047	3/17/2020 10:00	21.64397289	3/17/2020 20:00	0
3/17/2020 0:15	97.13392714	3/17/2020 10:15	17.42075867	3/17/2020 20:15	0
3/17/2020 0:30	95.81417269	3/17/2020 10:30	31.93805756	3/17/2020 20:30	0
3/17/2020 0:45	115.8744403	3/17/2020 10:45	55.42968668	3/17/2020 20:45	0
3/17/2020 1:00	188.7248856	3/17/2020 11:00	39.59263334	3/17/2020 21:00	0
3/17/2020 1:15	137.782364	3/17/2020 11:15	68.62723113	3/17/2020 21:15	1.055803556
3/17/2020 1:30	194.0039034	3/17/2020 11:30	40.91238779	3/17/2020 21:30	11.87779
3/17/2020 1:45	196.6434123	3/17/2020 11:45	169.7204216	3/17/2020 21:45	45.13560201
3/17/2020 2:00	209.5770058	3/17/2020 12:00	129.5998865	3/17/2020 22:00	97.39787803

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/17/2020 22:15	14.253348
3/17/2020 22:30	15.30915156
3/17/2020 22:45	105.0524538
3/17/2020 23:00	123.529016
3/17/2020 23:15	67.57142757
3/17/2020 23:30	76.01785602
3/17/2020 23:45	93.43861469
3/18/2020 0:00	105.5803556
3/18/2020 0:15	188.1969838
3/18/2020 0:30	102.4129449
3/18/2020 0:45	112.4430787
3/18/2020 1:00	109.0117171
3/18/2020 1:15	123.529016
3/18/2020 1:30	132.5033463
3/18/2020 1:45	140.157922
3/18/2020 2:00	153.8833683
3/18/2020 2:15	167.3448636
3/18/2020 2:30	176.8470956
3/18/2020 2:45	185.0295732
3/18/2020 3:00	196.9073632
3/18/2020 3:15	205.0898407
3/18/2020 3:30	212.7444165
3/18/2020 3:45	207.2014478
3/18/2020 4:00	211.4246621
3/18/2020 4:15	213.0083674
3/18/2020 4:30	209.8409567
3/18/2020 4:45	211.6886129
3/18/2020 5:00	265.0066925
3/18/2020 5:15	267.6462014
3/18/2020 5:30	270.5496612
3/18/2020 5:45	272.6612683
3/18/2020 6:00	254.1847061
3/18/2020 6:15	271.8694156
3/18/2020 6:30	279.2600405
3/18/2020 6:45	249.4335901
3/18/2020 7:00	282.1635003
3/18/2020 7:15	274.2449736
3/18/2020 7:30	281.8995494
3/18/2020 7:45	300.3761116
3/18/2020 8:00	293.7773394

Date and Time	Volume (Gal)
3/18/2020 8:15	279.7879423
3/18/2020 8:30	335.4815799
3/18/2020 8:45	267.1182996
3/18/2020 9:00	391.9670701
3/18/2020 9:15	393.0228737
3/18/2020 9:30	426.2806857
3/18/2020 9:45	255.5044605
3/18/2020 10:00	228.5814698
3/18/2020 10:15	219.6071396
3/18/2020 10:30	269.7578085
3/18/2020 10:45	262.3671836
3/18/2020 11:00	616.3253257
3/18/2020 11:15	445.8130515
3/18/2020 11:30	346.0396154
3/18/2020 11:45	451.8839219
3/18/2020 12:00	529.4854833
3/18/2020 12:15	334.9536781
3/18/2020 12:30	344.719861
3/18/2020 12:45	260.7834783
3/18/2020 13:00	141.4776765
3/18/2020 13:15	132.2393954
3/18/2020 13:30	374.0184097
3/18/2020 13:45	298.0005536
3/18/2020 14:00	260.7834783
3/18/2020 14:15	100.0373869
3/18/2020 14:30	167.3448636
3/18/2020 14:45	107.1640609
3/18/2020 15:00	126.6964267
3/18/2020 15:15	63.61216424
3/18/2020 15:30	62.29240979
3/18/2020 15:45	68.89118202
3/18/2020 16:00	65.45982046
3/18/2020 16:15	55.95758846
3/18/2020 16:30	49.88671801
3/18/2020 16:45	43.81584757
3/18/2020 17:00	40.38448601
3/18/2020 17:15	46.71930735
3/18/2020 17:30	63.61216424
3/18/2020 17:45	56.22153935
3/18/2020 18:00	49.62276712

Date and Time	Volume (Gal)
3/18/2020 18:15	1.847656223
3/18/2020 18:30	21.64397289
3/18/2020 18:45	50.67857068
3/18/2020 19:00	32.46595934
3/18/2020 19:15	10.03013378
3/18/2020 19:30	48.30301268
3/18/2020 19:45	7.126674002
3/18/2020 20:00	48.56696357
3/18/2020 20:15	55.42968668
3/18/2020 20:30	62.29240979
3/18/2020 20:45	64.40401691
3/18/2020 21:00	54.10993224
3/18/2020 21:15	2.111607112
3/18/2020 21:30	40.38448601
3/18/2020 21:45	56.74944113
3/18/2020 22:00	56.48549024
3/18/2020 22:15	60.70870446
3/18/2020 22:30	44.34374935
3/18/2020 22:45	31.93805756
3/18/2020 23:00	68.36328024
3/18/2020 23:15	38.00892801
3/18/2020 23:30	41.44028957
3/18/2020 23:45	47.51116001
3/19/2020 0:00	48.03906179
3/19/2020 0:15	36.68917357
3/19/2020 0:30	72.05859269
3/19/2020 0:45	130.65569
3/19/2020 1:00	91.06305669
3/19/2020 1:15	87.89564602
3/19/2020 1:30	69.94698557
3/19/2020 1:45	47.7751109
3/19/2020 2:00	41.44028957
3/19/2020 2:15	47.24720912
3/19/2020 2:30	56.22153935
3/19/2020 2:45	48.30301268
3/19/2020 3:00	62.02845891
3/19/2020 3:15	63.08426246
3/19/2020 3:30	79.97711935
3/19/2020 3:45	72.32254358
3/19/2020 4:00	63.08426246

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/19/2020 4:15	63.34821335
3/19/2020 4:30	68.09932935
3/19/2020 4:45	53.58203046
3/19/2020 5:00	54.37388313
3/19/2020 5:15	53.31807957
3/19/2020 5:30	54.10993224
3/19/2020 5:45	63.87611513
3/19/2020 6:00	41.17633868
3/19/2020 6:15	55.95758846
3/19/2020 6:30	78.9213158
3/19/2020 6:45	57.80524468
3/19/2020 7:00	36.16127179
3/19/2020 7:15	72.32254358
3/19/2020 7:30	88.4235478
3/19/2020 7:45	107.4280118
3/19/2020 8:00	66.77957491
3/19/2020 8:15	130.65569
3/19/2020 8:30	53.58203046
3/19/2020 8:45	24.28348178
3/19/2020 9:00	26.92299067
3/19/2020 9:15	1.847656223
3/19/2020 9:30	1.583705334
3/19/2020 9:45	3.167410668
3/19/2020 10:00	0
3/19/2020 10:15	0
3/19/2020 10:30	0
3/19/2020 10:45	0
3/19/2020 11:00	0
3/19/2020 11:15	0
3/19/2020 11:30	0
3/19/2020 11:45	0
3/19/2020 12:00	0
3/19/2020 12:15	0
3/19/2020 12:30	0
3/19/2020 12:45	0
3/19/2020 13:00	0
3/19/2020 13:15	0
3/19/2020 13:30	0
3/19/2020 13:45	0
3/19/2020 14:00	0

Date and Time	Volume (Gal)
3/19/2020 14:15	0
3/19/2020 14:30	0
3/19/2020 14:45	0
3/19/2020 15:00	0
3/19/2020 15:15	0
3/19/2020 15:30	0
3/19/2020 15:45	0
3/19/2020 16:00	0
3/19/2020 16:15	0
3/19/2020 16:30	0
3/19/2020 16:45	0
3/19/2020 17:00	0
3/19/2020 17:15	0
3/19/2020 17:30	0
3/19/2020 17:45	0
3/19/2020 18:00	0
3/19/2020 18:15	0
3/19/2020 18:30	0
3/19/2020 18:45	0
3/19/2020 19:00	0
3/19/2020 19:15	0
3/19/2020 19:30	0
3/19/2020 19:45	0
3/19/2020 20:00	0
3/19/2020 20:15	0
3/19/2020 20:30	0
3/19/2020 20:45	0
3/19/2020 21:00	0
3/19/2020 21:15	0
3/19/2020 21:30	0
3/19/2020 21:45	0
3/19/2020 22:00	0
3/19/2020 22:15	0
3/19/2020 22:30	0
3/19/2020 22:45	0
3/19/2020 23:00	0
3/19/2020 23:15	0
3/19/2020 23:30	0
3/19/2020 23:45	0
3/20/2020 0:00	0

Date and Time	Volume (Gal)
3/20/2020 0:15	0
3/20/2020 0:30	0
3/20/2020 0:45	0
3/20/2020 1:00	0
3/20/2020 1:15	0
3/20/2020 1:30	0
3/20/2020 1:45	0
3/20/2020 2:00	0
3/20/2020 2:15	0
3/20/2020 2:30	0
3/20/2020 2:45	0
3/20/2020 3:00	0
3/20/2020 3:15	0
3/20/2020 3:30	0
3/20/2020 3:45	0
3/20/2020 4:00	0
3/20/2020 4:15	0
3/20/2020 4:30	0
3/20/2020 4:45	0
3/20/2020 5:00	0
3/20/2020 5:15	0
3/20/2020 5:30	0
3/20/2020 5:45	0
3/20/2020 6:00	0
3/20/2020 6:15	0
3/20/2020 6:30	0
3/20/2020 6:45	0
3/20/2020 7:00	0
3/20/2020 7:15	0
3/20/2020 7:30	0
3/20/2020 7:45	0
3/20/2020 8:00	7.65457578
3/20/2020 8:15	5.01506689
3/20/2020 8:30	0
3/20/2020 8:45	0
3/20/2020 9:00	0
3/20/2020 9:15	0
3/20/2020 9:30	0
3/20/2020 9:45	0
3/20/2020 10:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/20/2020 10:15	0	3/20/2020 20:15	0	3/21/2020 6:15	147.5485469
3/20/2020 10:30	0	3/20/2020 20:30	0	3/21/2020 6:30	146.7566943
3/20/2020 10:45	0	3/20/2020 20:45	0	3/21/2020 6:45	126.9603776
3/20/2020 11:00	0	3/20/2020 21:00	0	3/21/2020 7:00	139.6300203
3/20/2020 11:15	0	3/20/2020 21:15	0	3/21/2020 7:15	161.537944
3/20/2020 11:30	0	3/20/2020 21:30	0	3/21/2020 7:30	269.7578085
3/20/2020 11:45	0	3/20/2020 21:45	0	3/21/2020 7:45	276.3565807
3/20/2020 12:00	0	3/20/2020 22:00	93.43861469	3/21/2020 8:00	201.3945283
3/20/2020 12:15	0	3/20/2020 22:15	69.68303469	3/21/2020 8:15	278.4681879
3/20/2020 12:30	0	3/20/2020 22:30	63.34821335	3/21/2020 8:30	224.0943047
3/20/2020 12:45	0	3/20/2020 22:45	37.21707534	3/21/2020 8:45	378.7695257
3/20/2020 13:00	0	3/20/2020 23:00	31.67410668	3/21/2020 9:00	315.6852632
3/20/2020 13:15	0	3/20/2020 23:15	20.06026756	3/21/2020 9:15	236.2360456
3/20/2020 13:30	0	3/20/2020 23:30	29.56249956	3/21/2020 9:30	131.1835918
3/20/2020 13:45	0	3/20/2020 23:45	37.74497712	3/21/2020 9:45	77.07365958
3/20/2020 14:00	0	3/21/2020 0:00	50.1506689	3/21/2020 10:00	0
3/20/2020 14:15	0	3/21/2020 0:15	17.68470956	3/21/2020 10:15	0
3/20/2020 14:30	0	3/21/2020 0:30	42.76004401	3/21/2020 10:30	0
3/20/2020 14:45	0	3/21/2020 0:45	70.47488735	3/21/2020 10:45	0
3/20/2020 15:00	0	3/21/2020 1:00	125.904574	3/21/2020 11:00	0
3/20/2020 15:15	0	3/21/2020 1:15	112.9709805	3/21/2020 11:15	0
3/20/2020 15:30	0	3/21/2020 1:30	180.2784572	3/21/2020 11:30	0
3/20/2020 15:45	0	3/21/2020 1:45	87.63169513	3/21/2020 11:45	0
3/20/2020 16:00	0	3/21/2020 2:00	80.24107024	3/21/2020 12:00	0
3/20/2020 16:15	0	3/21/2020 2:15	57.01339202	3/21/2020 12:15	0
3/20/2020 16:30	0	3/21/2020 2:30	92.38281114	3/21/2020 12:30	0
3/20/2020 16:45	0	3/21/2020 2:45	90.00725314	3/21/2020 12:45	0
3/20/2020 17:00	0	3/21/2020 3:00	96.86997625	3/21/2020 13:00	0
3/20/2020 17:15	0	3/21/2020 3:15	93.1746638	3/21/2020 13:15	0
3/20/2020 17:30	0	3/21/2020 3:30	72.85044535	3/21/2020 13:30	0
3/20/2020 17:45	0	3/21/2020 3:45	68.09932935	3/21/2020 13:45	0
3/20/2020 18:00	0	3/21/2020 4:00	86.0479898	3/21/2020 14:00	0
3/20/2020 18:15	0	3/21/2020 4:15	87.10379336	3/21/2020 14:15	0
3/20/2020 18:30	0	3/21/2020 4:30	68.89118202	3/21/2020 14:30	0
3/20/2020 18:45	0	3/21/2020 4:45	130.3917391	3/21/2020 14:45	0
3/20/2020 19:00	0	3/21/2020 5:00	180.0145063	3/21/2020 15:00	0
3/20/2020 19:15	0	3/21/2020 5:15	183.1819169	3/21/2020 15:15	0
3/20/2020 19:30	0	3/21/2020 5:30	91.32700758	3/21/2020 15:30	0
3/20/2020 19:45	0	3/21/2020 5:45	117.1941947	3/21/2020 15:45	0
3/20/2020 20:00	0	3/21/2020 6:00	172.0959796	3/21/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/21/2020 16:15	0	3/22/2020 2:15	338.1210888	3/22/2020 12:15	469.5686315
3/21/2020 16:30	0	3/22/2020 2:30	336.0094816	3/22/2020 12:30	366.6277848
3/21/2020 16:45	0	3/22/2020 2:45	334.9536781	3/22/2020 12:45	259.9916256
3/21/2020 17:00	0	3/22/2020 3:00	331.2583656	3/22/2020 13:00	211.6886129
3/21/2020 17:15	0	3/22/2020 3:15	335.4815799	3/22/2020 13:15	118.7779
3/21/2020 17:30	0	3/22/2020 3:30	321.2282319	3/22/2020 13:30	44.87165112
3/21/2020 17:45	0	3/22/2020 3:45	321.7561336	3/22/2020 13:45	3.431361556
3/21/2020 18:00	0	3/22/2020 4:00	325.1874952	3/22/2020 14:00	0
3/21/2020 18:15	0	3/22/2020 4:15	472.999993	3/22/2020 14:15	0
3/21/2020 18:30	0	3/22/2020 4:30	1082.462596	3/22/2020 14:30	0
3/21/2020 18:45	0	3/22/2020 4:45	1045.24552	3/22/2020 14:45	0
3/21/2020 19:00	0	3/22/2020 5:00	1015.155119	3/22/2020 15:00	0
3/21/2020 19:15	10.29408467	3/22/2020 5:15	936.497754	3/22/2020 15:15	0
3/21/2020 19:30	90.7991058	3/22/2020 5:30	946.2639369	3/22/2020 15:30	0
3/21/2020 19:45	206.6735461	3/22/2020 5:45	878.9564602	3/22/2020 15:45	0
3/21/2020 20:00	382.728789	3/22/2020 6:00	862.5915051	3/22/2020 16:00	0
3/21/2020 20:15	594.153451	3/22/2020 6:15	345.2477628	3/22/2020 16:15	0
3/21/2020 20:30	381.1450837	3/22/2020 6:30	303.5435223	3/22/2020 16:30	0
3/21/2020 20:45	543.4748804	3/22/2020 6:45	302.4877187	3/22/2020 16:45	0
3/21/2020 21:00	817.4559031	3/22/2020 7:00	289.2901743	3/22/2020 17:00	0
3/21/2020 21:15	647.2075797	3/22/2020 7:15	338.3850396	3/22/2020 17:15	0
3/21/2020 21:30	645.3599235	3/22/2020 7:30	407.0122708	3/22/2020 17:30	0
3/21/2020 21:45	818.2477558	3/22/2020 7:45	417.5703063	3/22/2020 17:45	5.01506689
3/21/2020 22:00	995.6227532	3/22/2020 8:00	477.2232072	3/22/2020 18:00	16.10100423
3/21/2020 22:15	706.5965297	3/22/2020 8:15	390.9112665	3/22/2020 18:15	31.41015579
3/21/2020 22:30	599.6964197	3/22/2020 8:30	497.0195239	3/22/2020 18:30	59.38895002
3/21/2020 22:45	430.239949	3/22/2020 8:45	574.3571344	3/22/2020 18:45	53.31807957
3/21/2020 23:00	632.9542317	3/22/2020 9:00	486.4614884	3/22/2020 19:00	23.22767823
3/21/2020 23:15	576.7326924	3/22/2020 9:15	747.5089175	3/22/2020 19:15	28.24274512
3/21/2020 23:30	385.3682979	3/22/2020 9:30	1148.97822	3/22/2020 19:30	52.5262269
3/21/2020 23:45	778.9190733	3/22/2020 9:45	578.8442995	3/22/2020 19:45	81.56082469
3/22/2020 0:00	808.217622	3/22/2020 10:00	711.6115966	3/22/2020 20:00	88.68749869
3/22/2020 0:15	788.4213053	3/22/2020 10:15	947.5836914	3/22/2020 20:15	113.2349314
3/22/2020 0:30	401.2053512	3/22/2020 10:30	745.6612613	3/22/2020 20:30	157.8426316
3/22/2020 0:45	803.2025551	3/22/2020 10:45	835.9324653	3/22/2020 20:45	145.7008907
3/22/2020 1:00	787.1015509	3/22/2020 11:00	747.5089175	3/22/2020 21:00	221.7187467
3/22/2020 1:15	363.9882759	3/22/2020 11:15	813.2326889	3/22/2020 21:15	175.791292
3/22/2020 1:30	371.6428517	3/22/2020 11:30	505.2020015	3/22/2020 21:30	386.4241014
3/22/2020 1:45	360.0290125	3/22/2020 11:45	513.6484299	3/22/2020 21:45	258.9358221
3/22/2020 2:00	360.0290125	3/22/2020 12:00	598.3766653	3/22/2020 22:00	294.0412903

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/22/2020 22:15	220.9268941
3/22/2020 22:30	222.2466485
3/22/2020 22:45	243.0987687
3/22/2020 23:00	305.9190803
3/22/2020 23:15	361.6127179
3/22/2020 23:30	369.7951954
3/22/2020 23:45	234.6523403
3/23/2020 0:00	225.9419609
3/23/2020 0:15	258.1439694
3/23/2020 0:30	270.8136121
3/23/2020 0:45	235.7081438
3/23/2020 1:00	245.2103758
3/23/2020 1:15	586.2349244
3/23/2020 1:30	557.4642775
3/23/2020 1:45	427.6004401
3/23/2020 2:00	351.5825841
3/23/2020 2:15	445.0211988
3/23/2020 2:30	408.859927
3/23/2020 2:45	411.7633868
3/23/2020 3:00	215.6478763
3/23/2020 3:15	215.6478763
3/23/2020 3:30	235.9720947
3/23/2020 3:45	198.4910685
3/23/2020 4:00	167.3448636
3/23/2020 4:15	161.0100423
3/23/2020 4:30	163.6495512
3/23/2020 4:45	157.0507789
3/23/2020 5:00	152.8275647
3/23/2020 5:15	151.2438594
3/23/2020 5:30	156.786828
3/23/2020 5:45	167.3448636
3/23/2020 6:00	170.7762252
3/23/2020 6:15	229.6372734
3/23/2020 6:30	221.1908449
3/23/2020 6:45	194.0039034
3/23/2020 7:00	190.3085909
3/23/2020 7:15	185.293524
3/23/2020 7:30	167.0809127
3/23/2020 7:45	182.3900643
3/23/2020 8:00	192.4201981

Date and Time	Volume (Gal)
3/23/2020 8:15	264.4787907
3/23/2020 8:30	451.0920692
3/23/2020 8:45	523.1506619
3/23/2020 9:00	484.0859304
3/23/2020 9:15	504.6740997
3/23/2020 9:30	604.9754375
3/23/2020 9:45	1361.458685
3/23/2020 10:00	1038.910699
3/23/2020 10:15	1418.736028
3/23/2020 10:30	1242.416834
3/23/2020 10:45	1340.078663
3/23/2020 11:00	865.4949649
3/23/2020 11:15	952.0708565
3/23/2020 11:30	909.3108125
3/23/2020 11:45	353.9581421
3/23/2020 12:00	341.0245485
3/23/2020 12:15	209.8409567
3/23/2020 12:30	205.0898407
3/23/2020 12:45	352.1104859
3/23/2020 13:00	374.0184097
3/23/2020 13:15	241.7790143
3/23/2020 13:30	206.4095952
3/23/2020 13:45	210.8967603
3/23/2020 14:00	144.3811363
3/23/2020 14:15	109.5396189
3/23/2020 14:30	89.74330225
3/23/2020 14:45	67.83537846
3/23/2020 15:00	26.13113801
3/23/2020 15:15	21.90792378
3/23/2020 15:30	11.87779
3/23/2020 15:45	5.01506689
3/23/2020 16:00	0
3/23/2020 16:15	0
3/23/2020 16:30	0
3/23/2020 16:45	0
3/23/2020 17:00	0
3/23/2020 17:15	0
3/23/2020 17:30	0
3/23/2020 17:45	0
3/23/2020 18:00	0

Date and Time	Volume (Gal)
3/23/2020 18:15	0
3/23/2020 18:30	0
3/23/2020 18:45	0
3/23/2020 19:00	0
3/23/2020 19:15	0
3/23/2020 19:30	0
3/23/2020 19:45	0
3/23/2020 20:00	0
3/23/2020 20:15	0
3/23/2020 20:30	0
3/23/2020 20:45	0
3/23/2020 21:00	0
3/23/2020 21:15	0
3/23/2020 21:30	0
3/23/2020 21:45	0
3/23/2020 22:00	0
3/23/2020 22:15	0
3/23/2020 22:30	0
3/23/2020 22:45	0
3/23/2020 23:00	0
3/23/2020 23:15	0
3/23/2020 23:30	0
3/23/2020 23:45	0
3/24/2020 0:00	0
3/24/2020 0:15	0
3/24/2020 0:30	0
3/24/2020 0:45	0
3/24/2020 1:00	0
3/24/2020 1:15	0
3/24/2020 1:30	0
3/24/2020 1:45	0.263950889
3/24/2020 2:00	0.791852667
3/24/2020 2:15	0.527901778
3/24/2020 2:30	6.334821335
3/24/2020 2:45	5.542968668
3/24/2020 3:00	9.766182892
3/24/2020 3:15	9.766182892
3/24/2020 3:30	12.14174089
3/24/2020 3:45	11.34988823
3/24/2020 4:00	8.446428447

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/24/2020 4:15	9.502232003	3/24/2020 14:15	0	3/25/2020 0:15	0
3/24/2020 4:30	8.974330225	3/24/2020 14:30	0	3/25/2020 0:30	0
3/24/2020 4:45	9.502232003	3/24/2020 14:45	0	3/25/2020 0:45	0
3/24/2020 5:00	11.87779	3/24/2020 15:00	0	3/25/2020 1:00	0
3/24/2020 5:15	17.42075867	3/24/2020 15:15	0	3/25/2020 1:15	0
3/24/2020 5:30	26.13113801	3/24/2020 15:30	0	3/25/2020 1:30	0
3/24/2020 5:45	37.74497712	3/24/2020 15:45	0	3/25/2020 1:45	0
3/24/2020 6:00	83.93638269	3/24/2020 16:00	0	3/25/2020 2:00	0
3/24/2020 6:15	72.05859269	3/24/2020 16:15	0	3/25/2020 2:15	0
3/24/2020 6:30	69.94698557	3/24/2020 16:30	0	3/25/2020 2:30	0
3/24/2020 6:45	84.99218625	3/24/2020 16:45	0	3/25/2020 2:45	0
3/24/2020 7:00	74.43415069	3/24/2020 17:00	0	3/25/2020 3:00	0
3/24/2020 7:15	82.08872647	3/24/2020 17:15	0	3/25/2020 3:15	0
3/24/2020 7:30	65.72377135	3/24/2020 17:30	0	3/25/2020 3:30	0
3/24/2020 7:45	81.2968738	3/24/2020 17:45	0	3/25/2020 3:45	0
3/24/2020 8:00	84.99218625	3/24/2020 18:00	0	3/25/2020 4:00	0
3/24/2020 8:15	86.31194069	3/24/2020 18:15	0	3/25/2020 4:15	0
3/24/2020 8:30	103.4687485	3/24/2020 18:30	0	3/25/2020 4:30	0
3/24/2020 8:45	97.9257798	3/24/2020 18:45	0	3/25/2020 4:45	0
3/24/2020 9:00	86.31194069	3/24/2020 19:00	0	3/25/2020 5:00	0
3/24/2020 9:15	59.38895002	3/24/2020 19:15	0	3/25/2020 5:15	0
3/24/2020 9:30	57.01339202	3/24/2020 19:30	0	3/25/2020 5:30	0
3/24/2020 9:45	39.85658423	3/24/2020 19:45	0	3/25/2020 5:45	0
3/24/2020 10:00	27.71484334	3/24/2020 20:00	0	3/25/2020 6:00	0
3/24/2020 10:15	30.88225401	3/24/2020 20:15	0	3/25/2020 6:15	0
3/24/2020 10:30	19.53236578	3/24/2020 20:30	0	3/25/2020 6:30	0
3/24/2020 10:45	39.85658423	3/24/2020 20:45	0	3/25/2020 6:45	0
3/24/2020 11:00	29.82645045	3/24/2020 21:00	0	3/25/2020 7:00	0
3/24/2020 11:15	6.862723113	3/24/2020 21:15	0	3/25/2020 7:15	0
3/24/2020 11:30	4.487165112	3/24/2020 21:30	0	3/25/2020 7:30	0
3/24/2020 11:45	0	3/24/2020 21:45	0	3/25/2020 7:45	0
3/24/2020 12:00	0	3/24/2020 22:00	0	3/25/2020 8:00	0
3/24/2020 12:15	0	3/24/2020 22:15	0	3/25/2020 8:15	0
3/24/2020 12:30	0	3/24/2020 22:30	0	3/25/2020 8:30	0
3/24/2020 12:45	0	3/24/2020 22:45	0	3/25/2020 8:45	0
3/24/2020 13:00	0	3/24/2020 23:00	0	3/25/2020 9:00	0
3/24/2020 13:15	0	3/24/2020 23:15	0	3/25/2020 9:15	0
3/24/2020 13:30	0	3/24/2020 23:30	0	3/25/2020 9:30	0
3/24/2020 13:45	0	3/24/2020 23:45	0	3/25/2020 9:45	0
3/24/2020 14:00	0	3/25/2020 0:00	0	3/25/2020 10:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/25/2020 10:15	0	3/25/2020 20:15	382.9927399	3/26/2020 6:15	385.104347
3/25/2020 10:30	0	3/25/2020 20:30	365.3080303	3/26/2020 6:30	442.3816899
3/25/2020 10:45	0	3/25/2020 20:45	460.5943012	3/26/2020 6:45	437.366623
3/25/2020 11:00	0	3/25/2020 21:00	511.8007737	3/26/2020 7:00	452.9397255
3/25/2020 11:15	0	3/25/2020 21:15	384.0485434	3/26/2020 7:15	430.5038999
3/25/2020 11:30	0	3/25/2020 21:30	639.2890531	3/26/2020 7:30	434.7271141
3/25/2020 11:45	0	3/25/2020 21:45	441.5898372	3/26/2020 7:45	438.9503283
3/25/2020 12:00	0	3/25/2020 22:00	477.2232072	3/26/2020 8:00	442.3816899
3/25/2020 12:15	0	3/25/2020 22:15	431.0318017	3/26/2020 8:15	428.6562437
3/25/2020 12:30	0	3/25/2020 22:30	425.7527839	3/26/2020 8:30	405.1646146
3/25/2020 12:45	0	3/25/2020 22:45	348.1512225	3/26/2020 8:45	408.859927
3/25/2020 13:00	0	3/25/2020 23:00	273.7170719	3/26/2020 9:00	418.362159
3/25/2020 13:15	0	3/25/2020 23:15	326.5072496	3/26/2020 9:15	378.7695257
3/25/2020 13:30	0	3/25/2020 23:30	329.9386112	3/26/2020 9:30	372.6986552
3/25/2020 13:45	0	3/25/2020 23:45	623.4519997	3/26/2020 9:45	382.9927399
3/25/2020 14:00	0	3/26/2020 0:00	594.6813528	3/26/2020 10:00	356.597651
3/25/2020 14:15	0	3/26/2020 0:15	578.5803486	3/26/2020 10:15	442.9095917
3/25/2020 14:30	0	3/26/2020 0:30	573.3013308	3/26/2020 10:30	387.479905
3/25/2020 14:45	0	3/26/2020 0:45	562.2153935	3/26/2020 10:45	209.0491041
3/25/2020 15:00	0	3/26/2020 1:00	545.8504384	3/26/2020 11:00	201.6584792
3/25/2020 15:15	0	3/26/2020 1:15	544.5306839	3/26/2020 11:15	131.4475427
3/25/2020 15:30	0	3/26/2020 1:30	547.6980946	3/26/2020 11:30	142.53348
3/25/2020 15:45	0	3/26/2020 1:45	531.0691886	3/26/2020 11:45	163.3856003
3/25/2020 16:00	0	3/26/2020 2:00	526.0541217	3/26/2020 12:00	194.5318052
3/25/2020 16:15	0	3/26/2020 2:15	525.5262199	3/26/2020 12:15	497.8113766
3/25/2020 16:30	0	3/26/2020 2:30	536.8761081	3/26/2020 12:30	166.0251092
3/25/2020 16:45	0	3/26/2020 2:45	516.2879388	3/26/2020 12:45	157.3147298
3/25/2020 17:00	0	3/26/2020 3:00	522.6227601	3/26/2020 13:00	94.49441825
3/25/2020 17:15	0	3/26/2020 3:15	509.9531175	3/26/2020 13:15	2.111607112
3/25/2020 17:30	0	3/26/2020 3:30	512.3286755	3/26/2020 13:30	1.319754445
3/25/2020 17:45	0	3/26/2020 3:45	507.3136086	3/26/2020 13:45	0
3/25/2020 18:00	0	3/26/2020 4:00	500.4508855	3/26/2020 14:00	0
3/25/2020 18:15	0	3/26/2020 4:15	483.0301268	3/26/2020 14:15	0
3/25/2020 18:30	0	3/26/2020 4:30	485.4056848	3/26/2020 14:30	0
3/25/2020 18:45	0	3/26/2020 4:45	459.0105959	3/26/2020 14:45	0
3/25/2020 19:00	0	3/26/2020 5:00	462.1780066	3/26/2020 15:00	0
3/25/2020 19:15	4.223214223	3/26/2020 5:15	454.2594799	3/26/2020 15:15	0
3/25/2020 19:30	72.05859269	3/26/2020 5:30	408.5959761	3/26/2020 15:30	0
3/25/2020 19:45	145.1729889	3/26/2020 5:45	419.6819134	3/26/2020 15:45	0
3/25/2020 20:00	257.6160676	3/26/2020 6:00	430.239949	3/26/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/26/2020 16:15	0
3/26/2020 16:30	0
3/26/2020 16:45	0
3/26/2020 17:00	0
3/26/2020 17:15	0
3/26/2020 17:30	0
3/26/2020 17:45	0
3/26/2020 18:00	0
3/26/2020 18:15	0
3/26/2020 18:30	0
3/26/2020 18:45	0
3/26/2020 19:00	0
3/26/2020 19:15	0
3/26/2020 19:30	0
3/26/2020 19:45	0
3/26/2020 20:00	0
3/26/2020 20:15	0
3/26/2020 20:30	0.527901778
3/26/2020 20:45	19.00446401
3/26/2020 21:00	77.60156135
3/26/2020 21:15	116.402342
3/26/2020 21:30	132.5033463
3/26/2020 21:45	178.16685
3/26/2020 22:00	220.6629432
3/26/2020 22:15	0
3/26/2020 22:30	0
3/26/2020 22:45	0
3/26/2020 23:00	0
3/26/2020 23:15	191.3643945
3/26/2020 23:30	181.8621625
3/26/2020 23:45	194.2678543
3/27/2020 0:00	206.4095952
3/27/2020 0:15	218.5513361
3/27/2020 0:30	219.6071396
3/27/2020 0:45	227.2617154
3/27/2020 1:00	228.0535681
3/27/2020 1:15	232.2767823
3/27/2020 1:30	233.5965367
3/27/2020 1:45	233.5965367
3/27/2020 2:00	232.8046841

Date and Time	Volume (Gal)
3/27/2020 2:15	238.3476527
3/27/2020 2:30	241.7790143
3/27/2020 2:45	230.9570278
3/27/2020 3:00	232.5407332
3/27/2020 3:15	238.0837018
3/27/2020 3:30	237.2918492
3/27/2020 3:45	232.0128314
3/27/2020 4:00	235.444193
3/27/2020 4:15	239.4034563
3/27/2020 4:30	243.6266705
3/27/2020 4:45	239.6674072
3/27/2020 5:00	245.4743267
3/27/2020 5:15	248.9056883
3/27/2020 5:30	253.6568043
3/27/2020 5:45	254.9765587
3/27/2020 6:00	258.9358221
3/27/2020 6:15	263.6869381
3/27/2020 6:30	268.9659559
3/27/2020 6:45	344.719861
3/27/2020 7:00	350.2628296
3/27/2020 7:15	364.7801285
3/27/2020 7:30	371.9068025
3/27/2020 7:45	363.724325
3/27/2020 8:00	360.5569143
3/27/2020 8:15	362.6685214
3/27/2020 8:30	376.9218694
3/27/2020 8:45	341.5524503
3/27/2020 9:00	349.9988788
3/27/2020 9:15	358.4453072
3/27/2020 9:30	256.0323623
3/27/2020 9:45	470.624435
3/27/2020 10:00	358.973209
3/27/2020 10:15	396.1902843
3/27/2020 10:30	349.470977
3/27/2020 10:45	303.0156205
3/27/2020 11:00	299.8482099
3/27/2020 11:15	0.791852667
3/27/2020 11:30	21.38002201
3/27/2020 11:45	63.61216424
3/27/2020 12:00	3.959263334

Date and Time	Volume (Gal)
3/27/2020 12:15	4.223214223
3/27/2020 12:30	0
3/27/2020 12:45	0
3/27/2020 13:00	0
3/27/2020 13:15	0
3/27/2020 13:30	0
3/27/2020 13:45	0
3/27/2020 14:00	0
3/27/2020 14:15	0
3/27/2020 14:30	0
3/27/2020 14:45	0
3/27/2020 15:00	0
3/27/2020 15:15	0
3/27/2020 15:30	0
3/27/2020 15:45	0
3/27/2020 16:00	0
3/27/2020 16:15	0
3/27/2020 16:30	0
3/27/2020 16:45	0
3/27/2020 17:00	0
3/27/2020 17:15	0
3/27/2020 17:30	0
3/27/2020 17:45	0
3/27/2020 18:00	0
3/27/2020 18:15	0
3/27/2020 18:30	0
3/27/2020 18:45	0
3/27/2020 19:00	0
3/27/2020 19:15	0
3/27/2020 19:30	0
3/27/2020 19:45	0
3/27/2020 20:00	0
3/27/2020 20:15	0
3/27/2020 20:30	0
3/27/2020 20:45	0
3/27/2020 21:00	0
3/27/2020 21:15	0
3/27/2020 21:30	0
3/27/2020 21:45	0
3/27/2020 22:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/27/2020 22:15	0
3/27/2020 22:30	0
3/27/2020 22:45	0
3/27/2020 23:00	6.334821335
3/27/2020 23:15	27.97879423
3/27/2020 23:30	36.16127179
3/27/2020 23:45	48.56696357
3/28/2020 0:00	58.33314646
3/28/2020 0:15	78.9213158
3/28/2020 0:30	60.18080268
3/28/2020 0:45	78.9213158
3/28/2020 1:00	59.38895002
3/28/2020 1:15	45.66350379
3/28/2020 1:30	46.71930735
3/28/2020 1:45	63.61216424
3/28/2020 2:00	63.87611513
3/28/2020 2:15	51.47042335
3/28/2020 2:30	53.05412868
3/28/2020 2:45	155.2031227
3/28/2020 3:00	173.415734
3/28/2020 3:15	162.5937476
3/28/2020 3:30	181.0703098
3/28/2020 3:45	193.7399525
3/28/2020 4:00	210.1049076
3/28/2020 4:15	223.0385012
3/28/2020 4:30	129.0719847
3/28/2020 4:45	192.4201981
3/28/2020 5:00	197.6992158
3/28/2020 5:15	214.8560236
3/28/2020 5:30	230.1651752
3/28/2020 5:45	236.2360456
3/28/2020 6:00	238.3476527
3/28/2020 6:15	247.321983
3/28/2020 6:30	196.3794614
3/28/2020 6:45	226.9977645
3/28/2020 7:00	187.1411803
3/28/2020 7:15	226.4698627
3/28/2020 7:30	248.9056883
3/28/2020 7:45	188.4609347
3/28/2020 8:00	205.6177425

Date and Time	Volume (Gal)
3/28/2020 8:15	202.9782336
3/28/2020 8:30	315.1573614
3/28/2020 8:45	228.5814698
3/28/2020 9:00	199.0189703
3/28/2020 9:15	303.0156205
3/28/2020 9:30	109.275668
3/28/2020 9:45	107.4280118
3/28/2020 10:00	44.07979846
3/28/2020 10:15	39.32868246
3/28/2020 10:30	2.63950889
3/28/2020 10:45	4.487165112
3/28/2020 11:00	0
3/28/2020 11:15	0
3/28/2020 11:30	0
3/28/2020 11:45	0
3/28/2020 12:00	0
3/28/2020 12:15	0
3/28/2020 12:30	0
3/28/2020 12:45	0
3/28/2020 13:00	0
3/28/2020 13:15	0
3/28/2020 13:30	0
3/28/2020 13:45	0
3/28/2020 14:00	0
3/28/2020 14:15	0
3/28/2020 14:30	0
3/28/2020 14:45	0
3/28/2020 15:00	0
3/28/2020 15:15	0
3/28/2020 15:30	0
3/28/2020 15:45	0
3/28/2020 16:00	0
3/28/2020 16:15	0
3/28/2020 16:30	0
3/28/2020 16:45	0
3/28/2020 17:00	0
3/28/2020 17:15	0
3/28/2020 17:30	0
3/28/2020 17:45	0
3/28/2020 18:00	0

Date and Time	Volume (Gal)
3/28/2020 18:15	0
3/28/2020 18:30	0
3/28/2020 18:45	0
3/28/2020 19:00	0
3/28/2020 19:15	0
3/28/2020 19:30	0
3/28/2020 19:45	0
3/28/2020 20:00	0
3/28/2020 20:15	0
3/28/2020 20:30	0
3/28/2020 20:45	0
3/28/2020 21:00	0
3/28/2020 21:15	0
3/28/2020 21:30	0
3/28/2020 21:45	0
3/28/2020 22:00	0
3/28/2020 22:15	1.583705334
3/28/2020 22:30	7.390624891
3/28/2020 22:45	19.79631667
3/28/2020 23:00	39.59263334
3/28/2020 23:15	65.45982046
3/28/2020 23:30	74.69810158
3/28/2020 23:45	0
3/29/2020 0:00	49.35881624
3/29/2020 0:15	54.37388313
3/29/2020 0:30	58.86104824
3/29/2020 0:45	67.30747668
3/29/2020 1:00	0
3/29/2020 1:15	0
3/29/2020 1:30	83.6724318
3/29/2020 1:45	86.0479898
3/29/2020 2:00	93.96651647
3/29/2020 2:15	100.8292396
3/29/2020 2:30	109.5396189
3/29/2020 2:45	118.5139491
3/29/2020 3:00	118.5139491
3/29/2020 3:15	123.2650651
3/29/2020 3:30	141.2137256
3/29/2020 3:45	147.8124978
3/29/2020 4:00	134.6149534

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/29/2020 4:15	135.406806	3/29/2020 14:15	0	3/30/2020 0:15	522.0948584
3/29/2020 4:30	145.7008907	3/29/2020 14:30	0	3/30/2020 0:30	487.253341
3/29/2020 4:45	150.1880558	3/29/2020 14:45	0	3/30/2020 0:45	488.5730955
3/29/2020 5:00	244.1545723	3/29/2020 15:00	0	3/30/2020 1:00	488.0451937
3/29/2020 5:15	277.4123843	3/29/2020 15:15	0	3/30/2020 1:15	658.8214188
3/29/2020 5:30	289.0262234	3/29/2020 15:30	0	3/30/2020 1:30	670.6992088
3/29/2020 5:45	308.8225401	3/29/2020 15:45	0	3/30/2020 1:45	425.7527839
3/29/2020 6:00	341.8164012	3/29/2020 16:00	0	3/30/2020 2:00	366.099883
3/29/2020 6:15	297.208701	3/29/2020 16:15	0	3/30/2020 2:15	428.6562437
3/29/2020 6:30	317.5329194	3/29/2020 16:30	0	3/30/2020 2:30	341.8164012
3/29/2020 6:45	330.7304639	3/29/2020 16:45	0	3/30/2020 2:45	346.0396154
3/29/2020 7:00	373.226557	3/29/2020 17:00	0	3/30/2020 3:00	335.7455308
3/29/2020 7:15	376.1300168	3/29/2020 17:15	0	3/30/2020 3:15	343.1361556
3/29/2020 7:30	325.715397	3/29/2020 17:30	0	3/30/2020 3:30	332.0502183
3/29/2020 7:45	316.7410668	3/29/2020 17:45	0	3/30/2020 3:45	563.7990988
3/29/2020 8:00	334.9536781	3/29/2020 18:00	0	3/30/2020 4:00	547.1701928
3/29/2020 8:15	332.0502183	3/29/2020 18:15	0	3/30/2020 4:15	555.0887195
3/29/2020 8:30	357.6534545	3/29/2020 18:30	0	3/30/2020 4:30	533.7086975
3/29/2020 8:45	342.6082539	3/29/2020 18:45	0	3/30/2020 4:45	394.0786772
3/29/2020 9:00	883.7075762	3/29/2020 19:00	47.51116001	3/30/2020 5:00	403.3169583
3/29/2020 9:15	370.5870481	3/29/2020 19:15	161.0100423	3/30/2020 5:15	448.4525603
3/29/2020 9:30	348.9430752	3/29/2020 19:30	240.4592598	3/30/2020 5:30	684.4246551
3/29/2020 9:45	275.828679	3/29/2020 19:45	265.2706434	3/30/2020 5:45	506.5217559
3/29/2020 10:00	229.3733225	3/29/2020 20:00	255.7684114	3/30/2020 6:00	489.8928499
3/29/2020 10:15	275.0368263	3/29/2020 20:15	249.1696392	3/30/2020 6:15	466.4012208
3/29/2020 10:30	222.7745503	3/29/2020 20:30	362.9324723	3/30/2020 6:30	486.9893901
3/29/2020 10:45	231.7488805	3/29/2020 20:45	396.982137	3/30/2020 6:45	492.2684079
3/29/2020 11:00	166.0251092	3/29/2020 21:00	442.117739	3/30/2020 7:00	482.7661759
3/29/2020 11:15	14.51729889	3/29/2020 21:15	473.5278948	3/30/2020 7:15	478.0150599
3/29/2020 11:30	57.54129379	3/29/2020 21:30	484.6138321	3/30/2020 7:30	435.2550159
3/29/2020 11:45	71.00278913	3/29/2020 21:45	780.5027787	3/30/2020 7:45	450.0362657
3/29/2020 12:00	53.31807957	3/29/2020 22:00	887.6668396	3/30/2020 8:00	465.0814663
3/29/2020 12:15	10.82198645	3/29/2020 22:15	822.7349209	3/30/2020 8:15	369.0033428
3/29/2020 12:30	0	3/29/2020 22:30	686.2723113	3/30/2020 8:30	457.6908415
3/29/2020 12:45	0	3/29/2020 22:45	680.7293426	3/30/2020 8:45	453.995529
3/29/2020 13:00	0	3/29/2020 23:00	706.5965297	3/30/2020 9:00	471.6802386
3/29/2020 13:15	0	3/29/2020 23:15	675.4503248	3/30/2020 9:15	485.1417339
3/29/2020 13:30	0	3/29/2020 23:30	705.0128244	3/30/2020 9:30	355.2778965
3/29/2020 13:45	0	3/29/2020 23:45	582.5396119	3/30/2020 9:45	324.6595934
3/29/2020 14:00	0	3/30/2020 0:00	694.7187397	3/30/2020 10:00	338.9129414

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
3/30/2020 10:15	455.3152835	3/30/2020 20:15	1.847656223	3/31/2020 6:15	500.1869346
3/30/2020 10:30	486.1975375	3/30/2020 20:30	19.53236578	3/31/2020 6:30	508.8973139
3/30/2020 10:45	388.2717577	3/30/2020 20:45	56.74944113	3/31/2020 6:45	497.8113766
3/30/2020 11:00	321.2282319	3/30/2020 21:00	86.83984247	3/31/2020 7:00	529.2215324
3/30/2020 11:15	373.4905079	3/30/2020 21:15	74.43415069	3/31/2020 7:15	391.7031192
3/30/2020 11:30	278.204237	3/30/2020 21:30	86.57589158	3/31/2020 7:30	410.4436323
3/30/2020 11:45	275.3007772	3/30/2020 21:45	120.8895071	3/31/2020 7:45	417.0424046
3/30/2020 12:00	281.6355985	3/30/2020 22:00	166.8169618	3/31/2020 8:00	431.0318017
3/30/2020 12:15	61.50055713	3/30/2020 22:15	137.782364	3/31/2020 8:15	494.1160641
3/30/2020 12:30	32.46595934	3/30/2020 22:30	155.2031227	3/31/2020 8:30	512.3286755
3/30/2020 12:45	1.847656223	3/30/2020 22:45	112.9709805	3/31/2020 8:45	494.380015
3/30/2020 13:00	0	3/30/2020 23:00	211.9525638	3/31/2020 9:00	500.4508855
3/30/2020 13:15	0	3/30/2020 23:15	168.9285689	3/31/2020 9:15	0
3/30/2020 13:30	0	3/30/2020 23:30	192.1562472	3/31/2020 9:30	1077.71148
3/30/2020 13:45	0	3/30/2020 23:45	176.3191938	3/31/2020 9:45	621.0764417
3/30/2020 14:00	0	3/31/2020 0:00	237.0278983	3/31/2020 10:00	593.6255493
3/30/2020 14:15	0	3/31/2020 0:15	229.6372734	3/31/2020 10:15	443.1735426
3/30/2020 14:30	0	3/31/2020 0:30	202.1863809	3/31/2020 10:30	522.0948584
3/30/2020 14:45	0	3/31/2020 0:45	206.6735461	3/31/2020 10:45	1382.046855
3/30/2020 15:00	0	3/31/2020 1:00	185.8214258	3/31/2020 11:00	1120.999425
3/30/2020 15:15	0	3/31/2020 1:15	197.6992158	3/31/2020 11:15	763.6099218
3/30/2020 15:30	0	3/31/2020 1:30	185.293524	3/31/2020 11:30	255.2405096
3/30/2020 15:45	0	3/31/2020 1:45	184.7656223	3/31/2020 11:45	192.4201981
3/30/2020 16:00	0	3/31/2020 2:00	194.2678543	3/31/2020 12:00	211.9525638
3/30/2020 16:15	0	3/31/2020 2:15	160.4821405	3/31/2020 12:15	156.5228772
3/30/2020 16:30	0	3/31/2020 2:30	171.040176	3/31/2020 12:30	189.5167383
3/30/2020 16:45	0	3/31/2020 2:45	281.3716476	3/31/2020 12:45	235.444193
3/30/2020 17:00	0	3/31/2020 3:00	285.8588127	3/31/2020 13:00	243.0987687
3/30/2020 17:15	0	3/31/2020 3:15	308.8225401	3/31/2020 13:15	243.3627196
3/30/2020 17:30	0	3/31/2020 3:30	231.4849296	3/31/2020 13:30	237.819751
3/30/2020 17:45	0	3/31/2020 3:45	242.3069161	3/31/2020 13:45	339.1768923
3/30/2020 18:00	0	3/31/2020 4:00	241.7790143	3/31/2020 14:00	376.6579185
3/30/2020 18:15	0	3/31/2020 4:15	244.1545723	3/31/2020 14:15	248.1138356
3/30/2020 18:30	0	3/31/2020 4:30	238.3476527	3/31/2020 14:30	142.53348
3/30/2020 18:45	0	3/31/2020 4:45	261.3113801	3/31/2020 14:45	156.5228772
3/30/2020 19:00	0	3/31/2020 5:00	368.2114901	3/31/2020 15:00	133.8231007
3/30/2020 19:15	0	3/31/2020 5:15	399.8855968	3/31/2020 15:15	91.06305669
3/30/2020 19:30	0	3/31/2020 5:30	462.1780066	3/31/2020 15:30	82.35267736
3/30/2020 19:45	0	3/31/2020 5:45	487.7812428	3/31/2020 15:45	120.8895071
3/30/2020 20:00	0	3/31/2020 6:00	488.3091446	3/31/2020 16:00	79.44921758

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
3/31/2020 16:15	54.63783401
3/31/2020 16:30	56.74944113
3/31/2020 16:45	25.33928534
3/31/2020 17:00	19.26841489
3/31/2020 17:15	11.61383911
3/31/2020 17:30	12.14174089
3/31/2020 17:45	13.98939711
3/31/2020 18:00	32.46595934
3/31/2020 18:15	49.88671801
3/31/2020 18:30	67.57142757
3/31/2020 18:45	60.97265535
3/31/2020 19:00	69.15513291
3/31/2020 19:15	69.15513291
3/31/2020 19:30	78.12946313
3/31/2020 19:45	95.5502218
3/31/2020 20:00	142.7974309
3/31/2020 20:15	149.3962032
3/31/2020 20:30	266.5903978
3/31/2020 20:45	127.2243285
3/31/2020 21:00	185.5574749
3/31/2020 21:15	210.6328094
3/31/2020 21:30	183.1819169
3/31/2020 21:45	224.6222065
3/31/2020 22:00	268.4380541
3/31/2020 22:15	262.3671836
3/31/2020 22:30	298.0005536
3/31/2020 22:45	319.6445265
3/31/2020 23:00	208.2572514
3/31/2020 23:15	211.1607112
3/31/2020 23:30	222.5105994
3/31/2020 23:45	226.2059118
4/1/2020 0:00	234.9162912
4/1/2020 0:15	237.0278983
4/1/2020 0:30	243.8906214
4/1/2020 0:45	259.7276747
4/1/2020 1:00	278.4681879
4/1/2020 1:15	294.5691921
4/1/2020 1:30	302.4877187
4/1/2020 1:45	307.2388347
4/1/2020 2:00	339.1768923

Date and Time	Volume (Gal)
4/1/2020 2:15	341.2884994
4/1/2020 2:30	343.6640574
4/1/2020 2:45	348.6791243
4/1/2020 3:00	357.1255528
4/1/2020 3:15	347.095419
4/1/2020 3:30	360.8208652
4/1/2020 3:45	372.6986552
4/1/2020 4:00	386.4241014
4/1/2020 4:15	400.4134986
4/1/2020 4:30	405.6925163
4/1/2020 4:45	403.0530074
4/1/2020 5:00	419.9458643
4/1/2020 5:15	411.235485
4/1/2020 5:30	431.8236543
4/1/2020 5:45	434.7271141
4/1/2020 6:00	439.2142792
4/1/2020 6:15	447.3967568
4/1/2020 6:30	453.2036763
4/1/2020 6:45	457.4268906
4/1/2020 7:00	410.1796814
4/1/2020 7:15	457.6908415
4/1/2020 7:30	457.1629397
4/1/2020 7:45	439.2142792
4/1/2020 8:00	429.4480963
4/1/2020 8:15	415.1947483
4/1/2020 8:30	396.1902843
4/1/2020 8:45	379.0334765
4/1/2020 9:00	609.9905044
4/1/2020 9:15	488.8370464
4/1/2020 9:30	488.3091446
4/1/2020 9:45	489.3649481
4/1/2020 10:00	496.755573
4/1/2020 10:15	499.9229837
4/1/2020 10:30	506.7857068
4/1/2020 10:45	542.6830277
4/1/2020 11:00	388.2717577
4/1/2020 11:15	400.9414003
4/1/2020 11:30	677.2979811
4/1/2020 11:45	400.4134986
4/1/2020 12:00	434.1992123

Date and Time	Volume (Gal)
4/1/2020 12:15	388.2717577
4/1/2020 12:30	665.684142
4/1/2020 12:45	819.3035593
4/1/2020 13:00	558.7840319
4/1/2020 13:15	435.7829177
4/1/2020 13:30	391.7031192
4/1/2020 13:45	336.0094816
4/1/2020 14:00	453.7315781
4/1/2020 14:15	304.335375
4/1/2020 14:30	143.8532345
4/1/2020 14:45	115.3465385
4/1/2020 15:00	54.10993224
4/1/2020 15:15	44.60770023
4/1/2020 15:30	1.319754445
4/1/2020 15:45	0
4/1/2020 16:00	0
4/1/2020 16:15	0
4/1/2020 16:30	22.69977645
4/1/2020 16:45	45.66350379
4/1/2020 17:00	88.4235478
4/1/2020 17:15	115.8744403
4/1/2020 17:30	127.7522303
4/1/2020 17:45	128.0161811
4/1/2020 18:00	52.79017779
4/1/2020 18:15	26.13113801
4/1/2020 18:30	29.03459779
4/1/2020 18:45	52.79017779
4/1/2020 19:00	103.4687485
4/1/2020 19:15	170.2483234
4/1/2020 19:30	210.1049076
4/1/2020 19:45	274.2449736
4/1/2020 20:00	311.9899508
4/1/2020 20:15	339.968745
4/1/2020 20:30	358.973209
4/1/2020 20:45	419.4179626
4/1/2020 21:00	439.2142792
4/1/2020 21:15	460.0663995
4/1/2020 21:30	659.6132715
4/1/2020 21:45	679.4095882
4/1/2020 22:00	456.8989888

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
4/1/2020 22:15	608.9347008
4/1/2020 22:30	535.2924028
4/1/2020 22:45	533.4447466
4/1/2020 23:00	514.9681844
4/1/2020 23:15	503.6182961
4/1/2020 23:30	489.1009972
4/1/2020 23:45	497.0195239
4/2/2020 0:00	482.2382741
4/2/2020 0:15	475.6395019
4/2/2020 0:30	467.7209752
4/2/2020 0:45	455.3152835
4/2/2020 1:00	442.9095917
4/2/2020 1:15	451.619971
4/2/2020 1:30	448.9804621
4/2/2020 1:45	439.742181
4/2/2020 2:00	435.5189668
4/2/2020 2:15	426.0167348
4/2/2020 2:30	413.8749939
4/2/2020 2:45	417.3063554
4/2/2020 3:00	404.108811
4/2/2020 3:15	403.8448601
4/2/2020 3:30	418.0982081
4/2/2020 3:45	423.6411768
4/2/2020 4:00	410.1796814
4/2/2020 4:15	414.4028957
4/2/2020 4:30	416.7784537
4/2/2020 4:45	406.2204181
4/2/2020 5:00	400.9414003
4/2/2020 5:15	399.0937441
4/2/2020 5:30	403.8448601
4/2/2020 5:45	403.0530074
4/2/2020 6:00	371.6428517
4/2/2020 6:15	388.5357085
4/2/2020 6:30	327.5630532
4/2/2020 6:45	337.593187
4/2/2020 7:00	344.1919592
4/2/2020 7:15	311.1980981
4/2/2020 7:30	299.584259
4/2/2020 7:45	292.9854867
4/2/2020 8:00	531.3331395

Date and Time	Volume (Gal)
4/2/2020 8:15	486.1975375
4/2/2020 8:30	457.1629397
4/2/2020 8:45	220.1350414
4/2/2020 9:00	218.8152869
4/2/2020 9:15	322.8119372
4/2/2020 9:30	172.3599305
4/2/2020 9:45	98.71763247
4/2/2020 10:00	19.53236578
4/2/2020 10:15	0
4/2/2020 10:30	0
4/2/2020 10:45	0
4/2/2020 11:00	0
4/2/2020 11:15	0
4/2/2020 11:30	0
4/2/2020 11:45	0
4/2/2020 12:00	0
4/2/2020 12:15	0
4/2/2020 12:30	0
4/2/2020 12:45	0
4/2/2020 13:00	0
4/2/2020 13:15	0
4/2/2020 13:30	0
4/2/2020 13:45	0
4/2/2020 14:00	0
4/2/2020 14:15	0
4/2/2020 14:30	0
4/2/2020 14:45	0
4/2/2020 15:00	0
4/2/2020 15:15	0
4/2/2020 15:30	0
4/2/2020 15:45	0
4/2/2020 16:00	0
4/2/2020 16:15	0
4/2/2020 16:30	0
4/2/2020 16:45	0
4/2/2020 17:00	0
4/2/2020 17:15	0
4/2/2020 17:30	0
4/2/2020 17:45	0
4/2/2020 18:00	0

Date and Time	Volume (Gal)
4/2/2020 18:15	0
4/2/2020 18:30	0
4/2/2020 18:45	0
4/2/2020 19:00	0
4/2/2020 19:15	0
4/2/2020 19:30	32.72991023
4/2/2020 19:45	77.60156135
4/2/2020 20:00	133.8231007
4/2/2020 20:15	187.6690821
4/2/2020 20:30	248.9056883
4/2/2020 20:45	198.4910685
4/2/2020 21:00	226.9977645
4/2/2020 21:15	249.4335901
4/2/2020 21:30	271.077563
4/2/2020 21:45	291.9296832
4/2/2020 22:00	417.8342572
4/2/2020 22:15	404.9006637
4/2/2020 22:30	417.0424046
4/2/2020 22:45	414.6668466
4/2/2020 23:00	390.3833648
4/2/2020 23:15	393.0228737
4/2/2020 23:30	396.7181861
4/2/2020 23:45	388.5357085
4/3/2020 0:00	393.2868246
4/3/2020 0:15	384.5764452
4/3/2020 0:30	386.6880523
4/3/2020 0:45	379.2974274
4/3/2020 1:00	358.1813563
4/3/2020 1:15	348.6791243
4/3/2020 1:30	348.4151734
4/3/2020 1:45	344.4559101
4/3/2020 2:00	333.6339236
4/3/2020 2:15	322.8119372
4/3/2020 2:30	313.0457543
4/3/2020 2:45	305.3911785
4/3/2020 3:00	298.000536
4/3/2020 3:15	287.4425181
4/3/2020 3:30	288.7622725
4/3/2020 3:45	286.9146163
4/3/2020 4:00	275.828679

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/3/2020 4:15	271.3415139	4/3/2020 14:15	0	4/4/2020 0:15	872.357688
4/3/2020 4:30	284.0111565	4/3/2020 14:30	0	4/4/2020 0:30	860.479898
4/3/2020 4:45	304.0714241	4/3/2020 14:45	0	4/4/2020 0:45	844.3788938
4/3/2020 5:00	308.8225401	4/3/2020 15:00	0	4/4/2020 1:00	820.6233138
4/3/2020 5:15	315.9492141	4/3/2020 15:15	0	4/4/2020 1:15	828.0139387
4/3/2020 5:30	298.2645045	4/3/2020 15:30	0	4/4/2020 1:30	822.7349209
4/3/2020 5:45	311.7259999	4/3/2020 15:45	0	4/4/2020 1:45	810.59318
4/3/2020 6:00	304.0714241	4/3/2020 16:00	0	4/4/2020 2:00	781.0306804
4/3/2020 6:15	362.4045705	4/3/2020 16:15	0	4/4/2020 2:15	785.2538947
4/3/2020 6:30	370.0591463	4/3/2020 16:30	0	4/4/2020 2:30	781.0306804
4/3/2020 6:45	376.6579185	4/3/2020 16:45	0	4/4/2020 2:45	808.217622
4/3/2020 7:00	386.9520032	4/3/2020 17:00	0	4/4/2020 3:00	802.1467515
4/3/2020 7:15	396.7181861	4/3/2020 17:15	0	4/4/2020 3:15	798.1874882
4/3/2020 7:30	516.2879388	4/3/2020 17:30	0	4/4/2020 3:30	796.0758811
4/3/2020 7:45	499.9229837	4/3/2020 17:45	0	4/4/2020 3:45	780.5027787
4/3/2020 8:00	497.0195239	4/3/2020 18:00	0	4/4/2020 4:00	764.9296762
4/3/2020 8:15	229.1093716	4/3/2020 18:15	0	4/4/2020 4:15	764.1378235
4/3/2020 8:30	220.1350414	4/3/2020 18:30	0	4/4/2020 4:30	762.2901673
4/3/2020 8:45	215.3839254	4/3/2020 18:45	0	4/4/2020 4:45	796.339832
4/3/2020 9:00	179.2226536	4/3/2020 19:00	0	4/4/2020 5:00	801.3548989
4/3/2020 9:15	147.0206452	4/3/2020 19:15	0	4/4/2020 5:15	790.0050107
4/3/2020 9:30	290.082027	4/3/2020 19:30	0	4/4/2020 5:30	787.6294527
4/3/2020 9:45	320.1724283	4/3/2020 19:45	0	4/4/2020 5:45	783.9341402
4/3/2020 10:00	176.5831447	4/3/2020 20:00	0	4/4/2020 6:00	779.9748769
4/3/2020 10:15	16.36495512	4/3/2020 20:15	6.334821335	4/4/2020 6:15	801.6188498
4/3/2020 10:30	0	4/3/2020 20:30	45.13560201	4/4/2020 6:30	792.1166178
4/3/2020 10:45	0	4/3/2020 20:45	115.8744403	4/4/2020 6:45	786.3096982
4/3/2020 11:00	0	4/3/2020 21:00	155.7310245	4/4/2020 7:00	782.6143858
4/3/2020 11:15	0	4/3/2020 21:15	203.2421845	4/4/2020 7:15	795.0200775
4/3/2020 11:30	0	4/3/2020 21:30	259.199773	4/4/2020 7:30	786.3096982
4/3/2020 11:45	0	4/3/2020 21:45	352.9023385	4/4/2020 7:45	776.0156135
4/3/2020 12:00	0	4/3/2020 22:00	382.4648381	4/4/2020 8:00	445.2851497
4/3/2020 12:15	0	4/3/2020 22:15	410.1796814	4/4/2020 8:15	430.7678508
4/3/2020 12:30	0	4/3/2020 22:30	303.0156205	4/4/2020 8:30	429.7120472
4/3/2020 12:45	0	4/3/2020 22:45	339.1768923	4/4/2020 8:45	434.7271141
4/3/2020 13:00	0	4/3/2020 23:00	364.5161777	4/4/2020 9:00	296.9447501
4/3/2020 13:15	0	4/3/2020 23:15	392.231021	4/4/2020 9:15	467.7209752
4/3/2020 13:30	0	4/3/2020 23:30	546.3783401	4/4/2020 9:30	467.4570243
4/3/2020 13:45	0	4/3/2020 23:45	886.3470851	4/4/2020 9:45	525.262269
4/3/2020 14:00	0	4/4/2020 0:00	852.8253222	4/4/2020 10:00	484.0859304

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/4/2020 10:15	0	4/4/2020 20:15	0	4/5/2020 6:15	488.5730955
4/4/2020 10:30	0	4/4/2020 20:30	0	4/5/2020 6:30	493.5881624
4/4/2020 10:45	305.9190803	4/4/2020 20:45	0	4/5/2020 6:45	502.0345908
4/4/2020 11:00	86.57589158	4/4/2020 21:00	0	4/5/2020 7:00	526.8459744
4/4/2020 11:15	0	4/4/2020 21:15	26.3950889	4/5/2020 7:15	517.3437424
4/4/2020 11:30	0	4/4/2020 21:30	69.15513291	4/5/2020 7:30	517.0797915
4/4/2020 11:45	0	4/4/2020 21:45	103.7326994	4/5/2020 7:45	524.2064655
4/4/2020 12:00	4.223214223	4/4/2020 22:00	134.3510025	4/5/2020 8:00	526.0541217
4/4/2020 12:15	0	4/4/2020 22:15	169.7204216	4/5/2020 8:15	488.5730955
4/4/2020 12:30	0	4/4/2020 22:30	267.9101523	4/5/2020 8:30	502.8264435
4/4/2020 12:45	0	4/4/2020 22:45	0	4/5/2020 8:45	487.5172919
4/4/2020 13:00	0	4/4/2020 23:00	0	4/5/2020 9:00	485.1417339
4/4/2020 13:15	0	4/4/2020 23:15	0	4/5/2020 9:15	491.4765552
4/4/2020 13:30	0	4/4/2020 23:30	666.4759946	4/5/2020 9:30	455.0513326
4/4/2020 13:45	0	4/4/2020 23:45	484.6138321	4/5/2020 9:45	437.6305739
4/4/2020 14:00	0	4/5/2020 0:00	508.633363	4/5/2020 10:00	424.9609312
4/4/2020 14:15	0	4/5/2020 0:15	525.5262199	4/5/2020 10:15	259.7276747
4/4/2020 14:30	0	4/5/2020 0:30	547.6980946	4/5/2020 10:30	237.0278983
4/4/2020 14:45	0	4/5/2020 0:45	549.017849	4/5/2020 10:45	168.4006672
4/4/2020 15:00	0	4/5/2020 1:00	565.9107059	4/5/2020 11:00	95.28627091
4/4/2020 15:15	0	4/5/2020 1:15	0	4/5/2020 11:15	32.20200845
4/4/2020 15:30	0	4/5/2020 1:30	0	4/5/2020 11:30	37.21707534
4/4/2020 15:45	0	4/5/2020 1:45	0	4/5/2020 11:45	1.583705334
4/4/2020 16:00	0	4/5/2020 2:00	0	4/5/2020 12:00	22.69977645
4/4/2020 16:15	0	4/5/2020 2:15	0	4/5/2020 12:15	0
4/4/2020 16:30	0	4/5/2020 2:30	0	4/5/2020 12:30	0
4/4/2020 16:45	0	4/5/2020 2:45	517.0797915	4/5/2020 12:45	0.263950889
4/4/2020 17:00	0	4/5/2020 3:00	514.9681844	4/5/2020 13:00	3.431361556
4/4/2020 17:15	0	4/5/2020 3:15	520.7751039	4/5/2020 13:15	24.28348178
4/4/2020 17:30	0	4/5/2020 3:30	513.9123808	4/5/2020 13:30	29.03459779
4/4/2020 17:45	0	4/5/2020 3:45	514.1763317	4/5/2020 13:45	0
4/4/2020 18:00	0	4/5/2020 4:00	519.1913986	4/5/2020 14:00	0
4/4/2020 18:15	0	4/5/2020 4:15	522.6227601	4/5/2020 14:15	0
4/4/2020 18:30	0	4/5/2020 4:30	516.8158406	4/5/2020 14:30	0
4/4/2020 18:45	0	4/5/2020 4:45	440.7979846	4/5/2020 14:45	0
4/4/2020 19:00	0	4/5/2020 5:00	433.1434088	4/5/2020 15:00	0
4/4/2020 19:15	0	4/5/2020 5:15	432.615507	4/5/2020 15:15	0
4/4/2020 19:30	0	4/5/2020 5:30	542.4190768	4/5/2020 15:30	0
4/4/2020 19:45	0	4/5/2020 5:45	540.5714206	4/5/2020 15:45	0
4/4/2020 20:00	0	4/5/2020 6:00	488.0451937	4/5/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/5/2020 16:15	0	4/6/2020 2:15	217.4955325	4/6/2020 12:15	0
4/5/2020 16:30	0	4/6/2020 2:30	209.0491041	4/6/2020 12:30	0
4/5/2020 16:45	0	4/6/2020 2:45	208.5212023	4/6/2020 12:45	0
4/5/2020 17:00	0	4/6/2020 3:00	214.5920727	4/6/2020 13:00	0
4/5/2020 17:15	0	4/6/2020 3:15	308.5585892	4/6/2020 13:15	0
4/5/2020 17:30	0	4/6/2020 3:30	313.837607	4/6/2020 13:30	0
4/5/2020 17:45	0	4/6/2020 3:45	324.1316916	4/6/2020 13:45	0
4/5/2020 18:00	0	4/6/2020 4:00	326.7712005	4/6/2020 14:00	0
4/5/2020 18:15	0	4/6/2020 4:15	335.7455308	4/6/2020 14:15	0
4/5/2020 18:30	0	4/6/2020 4:30	340.2326959	4/6/2020 14:30	0
4/5/2020 18:45	0	4/6/2020 4:45	317.0050176	4/6/2020 14:45	0
4/5/2020 19:00	0	4/6/2020 5:00	382.2008872	4/6/2020 15:00	0
4/5/2020 19:15	0	4/6/2020 5:15	390.1194139	4/6/2020 15:15	0
4/5/2020 19:30	0	4/6/2020 5:30	394.3426281	4/6/2020 15:30	0
4/5/2020 19:45	0	4/6/2020 5:45	400.6774494	4/6/2020 15:45	0
4/5/2020 20:00	0	4/6/2020 6:00	403.0530074	4/6/2020 16:00	0
4/5/2020 20:15	0	4/6/2020 6:15	413.8749939	4/6/2020 16:15	0
4/5/2020 20:30	0	4/6/2020 6:30	376.9218694	4/6/2020 16:30	0
4/5/2020 20:45	0	4/6/2020 6:45	374.5463114	4/6/2020 16:45	0
4/5/2020 21:00	0	4/6/2020 7:00	370.3230972	4/6/2020 17:00	0
4/5/2020 21:15	0	4/6/2020 7:15	808.7455238	4/6/2020 17:15	0
4/5/2020 21:30	0	4/6/2020 7:30	804.2583587	4/6/2020 17:30	0
4/5/2020 21:45	5.01506689	4/6/2020 7:45	805.3141622	4/6/2020 17:45	0
4/5/2020 22:00	54.9017849	4/6/2020 8:00	803.9944078	4/6/2020 18:00	0
4/5/2020 22:15	62.29240979	4/6/2020 8:15	480.3906179	4/6/2020 18:15	0
4/5/2020 22:30	101.6210922	4/6/2020 8:30	372.4347043	4/6/2020 18:30	0
4/5/2020 22:45	0	4/6/2020 8:45	741.9659489	4/6/2020 18:45	0
4/5/2020 23:00	0	4/6/2020 9:00	458.746645	4/6/2020 19:00	0
4/5/2020 23:15	0	4/6/2020 9:15	365.0440794	4/6/2020 19:15	0
4/5/2020 23:30	0	4/6/2020 9:30	388.5357085	4/6/2020 19:30	0
4/5/2020 23:45	154.1473192	4/6/2020 9:45	112.1791278	4/6/2020 19:45	0
4/6/2020 0:00	164.9693056	4/6/2020 10:00	76.5457578	4/6/2020 20:00	0
4/6/2020 0:15	241.2511125	4/6/2020 10:15	56.48549024	4/6/2020 20:15	0
4/6/2020 0:30	244.1545723	4/6/2020 10:30	31.1462049	4/6/2020 20:30	0
4/6/2020 0:45	283.4832547	4/6/2020 10:45	4.751116001	4/6/2020 20:45	0
4/6/2020 1:00	228.8454207	4/6/2020 11:00	0	4/6/2020 21:00	0
4/6/2020 1:15	234.6523403	4/6/2020 11:15	0	4/6/2020 21:15	0
4/6/2020 1:30	249.697541	4/6/2020 11:30	0	4/6/2020 21:30	5.542968668
4/6/2020 1:45	200.8666265	4/6/2020 11:45	0	4/6/2020 21:45	24.28348178
4/6/2020 2:00	191.3643945	4/6/2020 12:00	0	4/6/2020 22:00	64.40401691

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
4/6/2020 22:15	64.14006602
4/6/2020 22:30	84.20033358
4/6/2020 22:45	93.1746638
4/6/2020 23:00	125.3766723
4/6/2020 23:15	136.4626096
4/6/2020 23:30	185.0295732
4/6/2020 23:45	207.4653987
4/7/2020 0:00	232.0128314
4/7/2020 0:15	201.1305774
4/7/2020 0:30	317.5329194
4/7/2020 0:45	301.1679643
4/7/2020 1:00	175.791292
4/7/2020 1:15	185.8214258
4/7/2020 1:30	194.7957561
4/7/2020 1:45	345.7756645
4/7/2020 2:00	355.0139457
4/7/2020 2:15	327.8270041
4/7/2020 2:30	268.1741032
4/7/2020 2:45	400.4134986
4/7/2020 3:00	390.6473157
4/7/2020 3:15	219.0792378
4/7/2020 3:30	222.2466485
4/7/2020 3:45	224.3582556
4/7/2020 4:00	225.4140592
4/7/2020 4:15	404.3727619
4/7/2020 4:30	404.9006637
4/7/2020 4:45	258.9358221
4/7/2020 5:00	261.0474292
4/7/2020 5:15	264.4787907
4/7/2020 5:30	266.5903978
4/7/2020 5:45	403.3169583
4/7/2020 6:00	304.8632767
4/7/2020 6:15	388.7996594
4/7/2020 6:30	447.6607077
4/7/2020 6:45	403.3169583
4/7/2020 7:00	386.4241014
4/7/2020 7:15	393.2868246
4/7/2020 7:30	360.8208652
4/7/2020 7:45	343.9280083
4/7/2020 8:00	381.6729854

Date and Time	Volume (Gal)
4/7/2020 8:15	441.5898372
4/7/2020 8:30	318.0608212
4/7/2020 8:45	298.0005536
4/7/2020 9:00	278.4681879
4/7/2020 9:15	442.117739
4/7/2020 9:30	617.6450802
4/7/2020 9:45	662.5167313
4/7/2020 10:00	496.2276712
4/7/2020 10:15	391.4391683
4/7/2020 10:30	242.8348178
4/7/2020 10:45	249.4335901
4/7/2020 11:00	172.0959796
4/7/2020 11:15	186.0853767
4/7/2020 11:30	139.6300203
4/7/2020 11:45	50.41461979
4/7/2020 12:00	49.62276712
4/7/2020 12:15	43.81584757
4/7/2020 12:30	26.3950889
4/7/2020 12:45	0
4/7/2020 13:00	0
4/7/2020 13:15	0
4/7/2020 13:30	0
4/7/2020 13:45	0
4/7/2020 14:00	0
4/7/2020 14:15	0
4/7/2020 14:30	0
4/7/2020 14:45	0
4/7/2020 15:00	0
4/7/2020 15:15	0
4/7/2020 15:30	0
4/7/2020 15:45	0
4/7/2020 16:00	0
4/7/2020 16:15	0
4/7/2020 16:30	0
4/7/2020 16:45	0
4/7/2020 17:00	0
4/7/2020 17:15	0
4/7/2020 17:30	0
4/7/2020 17:45	0
4/7/2020 18:00	0

Date and Time	Volume (Gal)
4/7/2020 18:15	0
4/7/2020 18:30	0
4/7/2020 18:45	0
4/7/2020 19:00	0
4/7/2020 19:15	0
4/7/2020 19:30	0
4/7/2020 19:45	0
4/7/2020 20:00	0
4/7/2020 20:15	0
4/7/2020 20:30	0
4/7/2020 20:45	0
4/7/2020 21:00	0
4/7/2020 21:15	0
4/7/2020 21:30	0
4/7/2020 21:45	0
4/7/2020 22:00	0
4/7/2020 22:15	0
4/7/2020 22:30	0
4/7/2020 22:45	0
4/7/2020 23:00	0
4/7/2020 23:15	0
4/7/2020 23:30	0
4/7/2020 23:45	0
4/8/2020 0:00	0
4/8/2020 0:15	0
4/8/2020 0:30	0
4/8/2020 0:45	0
4/8/2020 1:00	0
4/8/2020 1:15	0
4/8/2020 1:30	0
4/8/2020 1:45	0
4/8/2020 2:00	0
4/8/2020 2:15	0
4/8/2020 2:30	0
4/8/2020 2:45	0
4/8/2020 3:00	0
4/8/2020 3:15	0
4/8/2020 3:30	0
4/8/2020 3:45	0
4/8/2020 4:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/8/2020 4:15	0	4/8/2020 14:15	0	4/9/2020 0:15	634.0100353
4/8/2020 4:30	0	4/8/2020 14:30	0	4/9/2020 0:30	262.6311345
4/8/2020 4:45	0	4/8/2020 14:45	0	4/9/2020 0:45	292.7215359
4/8/2020 5:00	0	4/8/2020 15:00	0	4/9/2020 1:00	351.0546823
4/8/2020 5:15	0	4/8/2020 15:15	0	4/9/2020 1:15	281.8995494
4/8/2020 5:30	0	4/8/2020 15:30	0	4/9/2020 1:30	274.7728754
4/8/2020 5:45	0	4/8/2020 15:45	0	4/9/2020 1:45	229.1093716
4/8/2020 6:00	0	4/8/2020 16:00	0	4/9/2020 2:00	236.2360456
4/8/2020 6:15	0.791852667	4/8/2020 16:15	0	4/9/2020 2:15	304.335375
4/8/2020 6:30	0	4/8/2020 16:30	0	4/9/2020 2:30	300.9040134
4/8/2020 6:45	0	4/8/2020 16:45	0	4/9/2020 2:45	255.5044605
4/8/2020 7:00	0	4/8/2020 17:00	0	4/9/2020 3:00	276.3565807
4/8/2020 7:15	0.527901778	4/8/2020 17:15	0	4/9/2020 3:15	284.5390583
4/8/2020 7:30	2.903459779	4/8/2020 17:30	0	4/9/2020 3:30	299.8482099
4/8/2020 7:45	3.167410668	4/8/2020 17:45	0	4/9/2020 3:45	505.7299032
4/8/2020 8:00	2.903459779	4/8/2020 18:00	0	4/9/2020 4:00	380.353231
4/8/2020 8:15	0	4/8/2020 18:15	0	4/9/2020 4:15	409.3878288
4/8/2020 8:30	0	4/8/2020 18:30	0	4/9/2020 4:30	466.1372699
4/8/2020 8:45	0	4/8/2020 18:45	0	4/9/2020 4:45	1693.244953
4/8/2020 9:00	0	4/8/2020 19:00	0	4/9/2020 5:00	1592.151762
4/8/2020 9:15	0	4/8/2020 19:15	0	4/9/2020 5:15	1592.415713
4/8/2020 9:30	0	4/8/2020 19:30	0	4/9/2020 5:30	1319.490494
4/8/2020 9:45	0	4/8/2020 19:45	0	4/9/2020 5:45	1658.667386
4/8/2020 10:00	0	4/8/2020 20:00	0	4/9/2020 6:00	656.18191
4/8/2020 10:15	0	4/8/2020 20:15	0	4/9/2020 6:15	637.1774459
4/8/2020 10:30	0	4/8/2020 20:30	0	4/9/2020 6:30	718.2103689
4/8/2020 10:45	0	4/8/2020 20:45	0	4/9/2020 6:45	506.257805
4/8/2020 11:00	0	4/8/2020 21:00	3.167410668	4/9/2020 7:00	510.7449701
4/8/2020 11:15	0	4/8/2020 21:15	6.862723113	4/9/2020 7:15	494.9079168
4/8/2020 11:30	0	4/8/2020 21:30	17.68470956	4/9/2020 7:30	530.5412868
4/8/2020 11:45	0	4/8/2020 21:45	24.0195309	4/9/2020 7:45	563.271197
4/8/2020 12:00	0	4/8/2020 22:00	50.1506689	4/9/2020 8:00	627.4112631
4/8/2020 12:15	0	4/8/2020 22:15	93.96651647	4/9/2020 8:15	524.9983181
4/8/2020 12:30	0	4/8/2020 22:30	122.2092616	4/9/2020 8:30	531.8610413
4/8/2020 12:45	0	4/8/2020 22:45	144.3811363	4/9/2020 8:45	453.995529
4/8/2020 13:00	0	4/8/2020 23:00	136.7265605	4/9/2020 9:00	425.7527839
4/8/2020 13:15	0	4/8/2020 23:15	232.0128314	4/9/2020 9:15	578.0524468
4/8/2020 13:30	0	4/8/2020 23:30	166.8169618	4/9/2020 9:30	386.9520032
4/8/2020 13:45	0	4/8/2020 23:45	197.9631667	4/9/2020 9:45	227.5256663
4/8/2020 14:00	0	4/9/2020 0:00	176.8470956	4/9/2020 10:00	112.9709805

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/9/2020 10:15	80.76897202	4/9/2020 20:15	80.76897202	4/10/2020 6:15	368.7393919
4/9/2020 10:30	32.99386112	4/9/2020 20:30	91.85490936	4/10/2020 6:30	359.5011108
4/9/2020 10:45	0	4/9/2020 20:45	190.8364927	4/10/2020 6:45	367.1556865
4/9/2020 11:00	0	4/9/2020 21:00	248.6417374	4/10/2020 7:00	381.1450837
4/9/2020 11:15	0	4/9/2020 21:15	0	4/10/2020 7:15	377.7137221
4/9/2020 11:30	0	4/9/2020 21:30	0	4/10/2020 7:30	378.5055748
4/9/2020 11:45	0	4/9/2020 21:45	0	4/10/2020 7:45	374.5463114
4/9/2020 12:00	0	4/9/2020 22:00	0	4/10/2020 8:00	374.8102623
4/9/2020 12:15	0	4/9/2020 22:15	205.0898407	4/10/2020 8:15	366.8917357
4/9/2020 12:30	0	4/9/2020 22:30	421.2656188	4/10/2020 8:30	300.6400625
4/9/2020 12:45	0	4/9/2020 22:45	404.9006637	4/10/2020 8:45	331.5223165
4/9/2020 13:00	0	4/9/2020 23:00	417.8342572	4/10/2020 9:00	303.2795714
4/9/2020 13:15	0	4/9/2020 23:15	423.3772259	4/10/2020 9:15	502.2985417
4/9/2020 13:30	0	4/9/2020 23:30	410.7075832	4/10/2020 9:30	645.8878253
4/9/2020 13:45	0	4/9/2020 23:45	394.8705299	4/10/2020 9:45	603.6556831
4/9/2020 14:00	0	4/10/2020 0:00	404.108811	4/10/2020 10:00	535.2924028
4/9/2020 14:15	0	4/10/2020 0:15	403.3169583	4/10/2020 10:15	499.6590328
4/9/2020 14:30	0	4/10/2020 0:30	403.3169583	4/10/2020 10:30	428.1283419
4/9/2020 14:45	0	4/10/2020 0:45	422.5853732	4/10/2020 10:45	378.7695257
4/9/2020 15:00	0	4/10/2020 1:00	428.3922928	4/10/2020 11:00	313.837607
4/9/2020 15:15	0	4/10/2020 1:15	432.3515561	4/10/2020 11:15	203.2421845
4/9/2020 15:30	0	4/10/2020 1:30	421.2656188	4/10/2020 11:30	289.5541252
4/9/2020 15:45	0	4/10/2020 1:45	424.4330294	4/10/2020 11:45	217.2315816
4/9/2020 16:00	0	4/10/2020 2:00	443.7014443	4/10/2020 12:00	313.837607
4/9/2020 16:15	0	4/10/2020 2:15	425.488833	4/10/2020 12:15	309.3504419
4/9/2020 16:30	0	4/10/2020 2:30	435.5189668	4/10/2020 12:30	296.6807992
4/9/2020 16:45	0	4/10/2020 2:45	355.2778965	4/10/2020 12:45	327.8270041
4/9/2020 17:00	0	4/10/2020 3:00	359.5011108	4/10/2020 13:00	385.6322488
4/9/2020 17:15	0	4/10/2020 3:15	342.0803521	4/10/2020 13:15	302.7516696
4/9/2020 17:30	0	4/10/2020 3:30	350.2628296	4/10/2020 13:30	286.1227636
4/9/2020 17:45	0	4/10/2020 3:45	360.8208652	4/10/2020 13:45	388.5357085
4/9/2020 18:00	0	4/10/2020 4:00	357.9174054	4/10/2020 14:00	454.7873817
4/9/2020 18:15	0	4/10/2020 4:15	415.1947483	4/10/2020 14:15	252.073099
4/9/2020 18:30	0	4/10/2020 4:30	429.4480963	4/10/2020 14:30	162.0658458
4/9/2020 18:45	0	4/10/2020 4:45	415.7226501	4/10/2020 14:45	203.2421845
4/9/2020 19:00	0	4/10/2020 5:00	359.2371599	4/10/2020 15:00	73.64229802
4/9/2020 19:15	0	4/10/2020 5:15	356.597651	4/10/2020 15:15	0
4/9/2020 19:30	5.542968668	4/10/2020 5:30	347.8872716	4/10/2020 15:30	0
4/9/2020 19:45	41.44028957	4/10/2020 5:45	338.1210888	4/10/2020 15:45	0
4/9/2020 20:00	120.6255563	4/10/2020 6:00	361.8766688	4/10/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
4/10/2020 16:15	0
4/10/2020 16:30	0
4/10/2020 16:45	12.93359356
4/10/2020 17:00	14.51729889
4/10/2020 17:15	11.34988823
4/10/2020 17:30	7.65457578
4/10/2020 17:45	0
4/10/2020 18:00	0
4/10/2020 18:15	0
4/10/2020 18:30	0
4/10/2020 18:45	0
4/10/2020 19:00	26.92299067
4/10/2020 19:15	56.22153935
4/10/2020 19:30	139.6300203
4/10/2020 19:45	173.9436358
4/10/2020 20:00	325.4514461
4/10/2020 20:15	389.3275612
4/10/2020 20:30	411.235485
4/10/2020 20:45	350.5267805
4/10/2020 21:00	310.1422945
4/10/2020 21:15	328.090955
4/10/2020 21:30	393.8147263
4/10/2020 21:45	523.4146128
4/10/2020 22:00	458.4826941
4/10/2020 22:15	466.6651717
4/10/2020 22:30	448.4525603
4/10/2020 22:45	367.1556865
4/10/2020 23:00	373.7544588
4/10/2020 23:15	538.7237644
4/10/2020 23:30	447.3967568
4/10/2020 23:45	765.1936271
4/11/2020 0:00	736.1590293
4/11/2020 0:15	713.7232037
4/11/2020 0:30	749.8844755
4/11/2020 0:45	573.0373799
4/11/2020 1:00	617.3811293
4/11/2020 1:15	538.1958626
4/11/2020 1:30	624.7717542
4/11/2020 1:45	363.4603741
4/11/2020 2:00	493.3242115

Date and Time	Volume (Gal)
4/11/2020 2:15	496.4916221
4/11/2020 2:30	488.8370464
4/11/2020 2:45	470.624435
4/11/2020 3:00	474.5836984
4/11/2020 3:15	469.5686315
4/11/2020 3:30	459.8024486
4/11/2020 3:45	467.7209752
4/11/2020 4:00	444.2293461
4/11/2020 4:15	432.0876052
4/11/2020 4:30	434.7271141
4/11/2020 4:45	434.4631632
4/11/2020 5:00	431.2957526
4/11/2020 5:15	440.7979846
4/11/2020 5:30	452.1478728
4/11/2020 5:45	449.5083639
4/11/2020 6:00	466.4012208
4/11/2020 6:15	438.9503283
4/11/2020 6:30	428.3922928
4/11/2020 6:45	427.6004401
4/11/2020 7:00	426.0167348
4/11/2020 7:15	429.7120472
4/11/2020 7:30	398.0379406
4/11/2020 7:45	342.344303
4/11/2020 8:00	361.8766688
4/11/2020 8:15	350.2628296
4/11/2020 8:30	322.5479863
4/11/2020 8:45	365.3080303
4/11/2020 9:00	0
4/11/2020 9:15	0
4/11/2020 9:30	328.8828076
4/11/2020 9:45	162.5937476
4/11/2020 10:00	80.76897202
4/11/2020 10:15	26.13113801
4/11/2020 10:30	0
4/11/2020 10:45	0
4/11/2020 11:00	0
4/11/2020 11:15	0
4/11/2020 11:30	0
4/11/2020 11:45	0
4/11/2020 12:00	0

Date and Time	Volume (Gal)
4/11/2020 12:15	0
4/11/2020 12:30	0
4/11/2020 12:45	0
4/11/2020 13:00	0
4/11/2020 13:15	0
4/11/2020 13:30	0
4/11/2020 13:45	0
4/11/2020 14:00	0
4/11/2020 14:15	0
4/11/2020 14:30	0
4/11/2020 14:45	0
4/11/2020 15:00	0
4/11/2020 15:15	0
4/11/2020 15:30	0
4/11/2020 15:45	0
4/11/2020 16:00	0
4/11/2020 16:15	0
4/11/2020 16:30	0
4/11/2020 16:45	0
4/11/2020 17:00	0
4/11/2020 17:15	0
4/11/2020 17:30	0
4/11/2020 17:45	0
4/11/2020 18:00	0
4/11/2020 18:15	0
4/11/2020 18:30	0
4/11/2020 18:45	0
4/11/2020 19:00	0
4/11/2020 19:15	0
4/11/2020 19:30	0
4/11/2020 19:45	0
4/11/2020 20:00	0
4/11/2020 20:15	0
4/11/2020 20:30	1.583705334
4/11/2020 20:45	25.86718712
4/11/2020 21:00	82.61662824
4/11/2020 21:15	130.3917391
4/11/2020 21:30	210.3688585
4/11/2020 21:45	294.5691921
4/11/2020 22:00	229.6372734

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
4/11/2020 22:15	258.6718712
4/11/2020 22:30	286.1227636
4/11/2020 22:45	259.199773
4/11/2020 23:00	405.6925163
4/11/2020 23:15	256.0323623
4/11/2020 23:30	320.964281
4/11/2020 23:45	322.8119372
4/12/2020 0:00	374.5463114
4/12/2020 0:15	369.0033428
4/12/2020 0:30	377.1858203
4/12/2020 0:45	392.7589228
4/12/2020 1:00	414.6668466
4/12/2020 1:15	319.6445265
4/12/2020 1:30	356.597651
4/12/2020 1:45	405.9564672
4/12/2020 2:00	418.362159
4/12/2020 2:15	372.6986552
4/12/2020 2:30	424.1690786
4/12/2020 2:45	435.5189668
4/12/2020 3:00	483.8219795
4/12/2020 3:15	539.7795679
4/12/2020 3:30	407.2762217
4/12/2020 3:45	466.9291226
4/12/2020 4:00	391.9670701
4/12/2020 4:15	326.2432988
4/12/2020 4:30	497.2834748
4/12/2020 4:45	374.8102623
4/12/2020 5:00	377.7137221
4/12/2020 5:15	380.6171819
4/12/2020 5:30	509.1612648
4/12/2020 5:45	355.8057983
4/12/2020 6:00	504.6740997
4/12/2020 6:15	426.5446366
4/12/2020 6:30	421.5295697
4/12/2020 6:45	417.5703063
4/12/2020 7:00	475.9034528
4/12/2020 7:15	481.7103724
4/12/2020 7:30	481.7103724
4/12/2020 7:45	330.2025621
4/12/2020 8:00	619.2287855

Date and Time	Volume (Gal)
4/12/2020 8:15	612.6300133
4/12/2020 8:30	369.5312445
4/12/2020 8:45	362.9324723
4/12/2020 9:00	437.8945248
4/12/2020 9:15	421.0016679
4/12/2020 9:30	416.7784537
4/12/2020 9:45	339.1768923
4/12/2020 10:00	316.213165
4/12/2020 10:15	281.6355985
4/12/2020 10:30	313.3097052
4/12/2020 10:45	391.9670701
4/12/2020 11:00	381.6729854
4/12/2020 11:15	650.6389413
4/12/2020 11:30	659.6132715
4/12/2020 11:45	600.2243215
4/12/2020 12:00	533.4447466
4/12/2020 12:15	446.0770023
4/12/2020 12:30	440.7979846
4/12/2020 12:45	318.588723
4/12/2020 13:00	339.7047941
4/12/2020 13:15	449.244413
4/12/2020 13:30	404.3727619
4/12/2020 13:45	441.3258863
4/12/2020 14:00	428.1283419
4/12/2020 14:15	344.1919592
4/12/2020 14:30	309.086491
4/12/2020 14:45	239.6674072
4/12/2020 15:00	242.570867
4/12/2020 15:15	215.3839254
4/12/2020 15:30	222.5105994
4/12/2020 15:45	82.61662824
4/12/2020 16:00	86.31194069
4/12/2020 16:15	79.71316847
4/12/2020 16:30	310.1422945
4/12/2020 16:45	214.3281218
4/12/2020 17:00	690.7594764
4/12/2020 17:15	290.082027
4/12/2020 17:30	216.9676307
4/12/2020 17:45	173.9436358
4/12/2020 18:00	513.6484299

Date and Time	Volume (Gal)
4/12/2020 18:15	363.724325
4/12/2020 18:30	228.8454207
4/12/2020 18:45	32.99386112
4/12/2020 19:00	230.4291261
4/12/2020 19:15	46.45535646
4/12/2020 19:30	42.76004401
4/12/2020 19:45	7.390624891
4/12/2020 20:00	34.57756645
4/12/2020 20:15	4.751116001
4/12/2020 20:30	6.598772224
4/12/2020 20:45	0
4/12/2020 21:00	2.375558001
4/12/2020 21:15	1.583705334
4/12/2020 21:30	0
4/12/2020 21:45	0
4/12/2020 22:00	0
4/12/2020 22:15	0
4/12/2020 22:30	0
4/12/2020 22:45	0
4/12/2020 23:00	0
4/12/2020 23:15	0
4/12/2020 23:30	0
4/12/2020 23:45	0
4/13/2020 0:00	0
4/13/2020 0:15	0
4/13/2020 0:30	0
4/13/2020 0:45	0
4/13/2020 1:00	0
4/13/2020 1:15	0
4/13/2020 1:30	0
4/13/2020 1:45	0
4/13/2020 2:00	0
4/13/2020 2:15	0
4/13/2020 2:30	0
4/13/2020 2:45	0
4/13/2020 3:00	0
4/13/2020 3:15	0
4/13/2020 3:30	0
4/13/2020 3:45	0
4/13/2020 4:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/13/2020 4:15	0	4/13/2020 14:15	0	4/14/2020 0:15	559.0479828
4/13/2020 4:30	0	4/13/2020 14:30	0	4/14/2020 0:30	562.2153935
4/13/2020 4:45	0	4/13/2020 14:45	0	4/14/2020 0:45	569.6060184
4/13/2020 5:00	0	4/13/2020 15:00	0	4/14/2020 1:00	556.9363757
4/13/2020 5:15	0	4/13/2020 15:15	0	4/14/2020 1:15	572.773429
4/13/2020 5:30	0	4/13/2020 15:30	0	4/14/2020 1:30	575.148987
4/13/2020 5:45	0	4/13/2020 15:45	0	4/14/2020 1:45	559.5758846
4/13/2020 6:00	0	4/13/2020 16:00	0	4/14/2020 2:00	554.5608177
4/13/2020 6:15	0	4/13/2020 16:15	0	4/14/2020 2:15	555.8805721
4/13/2020 6:30	0	4/13/2020 16:30	0	4/14/2020 2:30	559.0479828
4/13/2020 6:45	0	4/13/2020 16:45	0	4/14/2020 2:45	566.1746568
4/13/2020 7:00	0	4/13/2020 17:00	0	4/14/2020 3:00	574.8850362
4/13/2020 7:15	0	4/13/2020 17:15	0	4/14/2020 3:15	587.5546788
4/13/2020 7:30	0	4/13/2020 17:30	0	4/14/2020 3:30	595.2092546
4/13/2020 7:45	0	4/13/2020 17:45	0	4/14/2020 3:45	604.9754375
4/13/2020 8:00	0	4/13/2020 18:00	0	4/14/2020 4:00	604.4475357
4/13/2020 8:15	0	4/13/2020 18:15	0	4/14/2020 4:15	599.1685179
4/13/2020 8:30	0	4/13/2020 18:30	0	4/14/2020 4:30	613.9497677
4/13/2020 8:45	0	4/13/2020 18:45	0	4/14/2020 4:45	597.3208617
4/13/2020 9:00	0	4/13/2020 19:00	0	4/14/2020 5:00	602.8638304
4/13/2020 9:15	0	4/13/2020 19:15	0	4/14/2020 5:15	587.8186297
4/13/2020 9:30	0	4/13/2020 19:30	0	4/14/2020 5:30	591.5139422
4/13/2020 9:45	0	4/13/2020 19:45	0.263950889	4/14/2020 5:45	585.1791208
4/13/2020 10:00	0	4/13/2020 20:00	24.28348178	4/14/2020 6:00	598.9045671
4/13/2020 10:15	0	4/13/2020 20:15	59.38895002	4/14/2020 6:15	580.9559066
4/13/2020 10:30	0	4/13/2020 20:30	99.77343603	4/14/2020 6:30	580.6919557
4/13/2020 10:45	0	4/13/2020 20:45	271.3415139	4/14/2020 6:45	564.0630497
4/13/2020 11:00	0	4/13/2020 21:00	0	4/14/2020 7:00	583.8593664
4/13/2020 11:15	0	4/13/2020 21:15	0	4/14/2020 7:15	535.5563537
4/13/2020 11:30	0	4/13/2020 21:30	0	4/14/2020 7:30	567.4944113
4/13/2020 11:45	0	4/13/2020 21:45	0	4/14/2020 7:45	493.0602606
4/13/2020 12:00	0	4/13/2020 22:00	0	4/14/2020 8:00	394.0786772
4/13/2020 12:15	0	4/13/2020 22:15	363.4603741	4/14/2020 8:15	529.7494341
4/13/2020 12:30	0	4/13/2020 22:30	552.9771124	4/14/2020 8:30	524.7343673
4/13/2020 12:45	0	4/13/2020 22:45	568.2862639	4/14/2020 8:45	504.6740997
4/13/2020 13:00	0	4/13/2020 23:00	571.1897237	4/14/2020 9:00	467.1930735
4/13/2020 13:15	0	4/13/2020 23:15	563.5351479	4/14/2020 9:15	546.9062419
4/13/2020 13:30	0	4/13/2020 23:30	566.9665095	4/14/2020 9:30	302.7516696
4/13/2020 13:45	0	4/13/2020 23:45	562.2153935	4/14/2020 9:45	221.1908449
4/13/2020 14:00	0	4/14/2020 0:00	565.3828042	4/14/2020 10:00	194.2678543

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/14/2020 10:15	81.56082469	4/14/2020 20:15	4.487165112	4/15/2020 6:15	418.362159
4/14/2020 10:30	22.69977645	4/14/2020 20:30	63.87611513	4/15/2020 6:30	428.1283419
4/14/2020 10:45	0	4/14/2020 20:45	113.7628331	4/15/2020 6:45	463.497761
4/14/2020 11:00	0	4/14/2020 21:00	149.660154	4/15/2020 7:00	613.9497677
4/14/2020 11:15	0	4/14/2020 21:15	161.0100423	4/15/2020 7:15	550.8655053
4/14/2020 11:30	0	4/14/2020 21:30	313.837607	4/15/2020 7:30	513.6484299
4/14/2020 11:45	0	4/14/2020 21:45	351.0546823	4/15/2020 7:45	632.9542317
4/14/2020 12:00	0	4/14/2020 22:00	373.7544588	4/15/2020 8:00	497.5474257
4/14/2020 12:15	0	4/14/2020 22:15	409.1238779	4/15/2020 8:15	464.2896137
4/14/2020 12:30	0	4/14/2020 22:30	461.122203	4/15/2020 8:30	475.9034528
4/14/2020 12:45	0	4/14/2020 22:45	510.7449701	4/15/2020 8:45	382.9927399
4/14/2020 13:00	0	4/14/2020 23:00	461.9140557	4/15/2020 9:00	464.8175155
4/14/2020 13:15	0	4/14/2020 23:15	484.3498812	4/15/2020 9:15	442.9095917
4/14/2020 13:30	0	4/14/2020 23:30	501.7706399	4/15/2020 9:30	341.8164012
4/14/2020 13:45	0	4/14/2020 23:45	535.8203046	4/15/2020 9:45	313.3097052
4/14/2020 14:00	0	4/15/2020 0:00	542.1551259	4/15/2020 10:00	237.0278983
4/14/2020 14:15	0	4/15/2020 0:15	569.0781166	4/15/2020 10:15	236.4999965
4/14/2020 14:30	0	4/15/2020 0:30	587.2907279	4/15/2020 10:30	201.9224301
4/14/2020 14:45	0	4/15/2020 0:45	593.0976475	4/15/2020 10:45	84.46428447
4/14/2020 15:00	0	4/15/2020 1:00	661.1969768	4/15/2020 11:00	6.862723113
4/14/2020 15:15	0	4/15/2020 1:15	658.8214188	4/15/2020 11:15	0
4/14/2020 15:30	0	4/15/2020 1:30	540.3074697	4/15/2020 11:30	0
4/14/2020 15:45	0	4/15/2020 1:45	528.4296797	4/15/2020 11:45	0
4/14/2020 16:00	0	4/15/2020 2:00	516.5518897	4/15/2020 12:00	0
4/14/2020 16:15	0	4/15/2020 2:15	513.384479	4/15/2020 12:15	0
4/14/2020 16:30	0	4/15/2020 2:30	547.6980946	4/15/2020 12:30	0
4/14/2020 16:45	0	4/15/2020 2:45	541.891175	4/15/2020 12:45	0
4/14/2020 17:00	0	4/15/2020 3:00	535.2924028	4/15/2020 13:00	0
4/14/2020 17:15	0	4/15/2020 3:15	522.6227601	4/15/2020 13:15	0
4/14/2020 17:30	0	4/15/2020 3:30	515.2321352	4/15/2020 13:30	0
4/14/2020 17:45	0	4/15/2020 3:45	511.008921	4/15/2020 13:45	0
4/14/2020 18:00	0	4/15/2020 4:00	513.6484299	4/15/2020 14:00	0
4/14/2020 18:15	0	4/15/2020 4:15	530.5412868	4/15/2020 14:15	0
4/14/2020 18:30	0	4/15/2020 4:30	454.5234308	4/15/2020 14:30	0
4/14/2020 18:45	0	4/15/2020 4:45	449.244413	4/15/2020 14:45	0
4/14/2020 19:00	0	4/15/2020 5:00	452.1478728	4/15/2020 15:00	0
4/14/2020 19:15	0	4/15/2020 5:15	461.122203	4/15/2020 15:15	0
4/14/2020 19:30	0	4/15/2020 5:30	471.1523368	4/15/2020 15:30	0
4/14/2020 19:45	0	4/15/2020 5:45	467.9849261	4/15/2020 15:45	0
4/14/2020 20:00	1.319754445	4/15/2020 6:00	564.5909515	4/15/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/15/2020 16:15	0	4/16/2020 2:15	477.4871581	4/16/2020 12:15	0
4/15/2020 16:30	0	4/16/2020 2:30	459.2745468	4/16/2020 12:30	0
4/15/2020 16:45	0	4/16/2020 2:45	446.6049041	4/16/2020 12:45	0
4/15/2020 17:00	0	4/16/2020 3:00	444.493297	4/16/2020 13:00	0
4/15/2020 17:15	0	4/16/2020 3:15	428.6562437	4/16/2020 13:15	0
4/15/2020 17:30	0	4/16/2020 3:30	287.1785672	4/16/2020 13:30	0
4/15/2020 17:45	0	4/16/2020 3:45	281.6355985	4/16/2020 13:45	0
4/15/2020 18:00	0	4/16/2020 4:00	284.5390583	4/16/2020 14:00	0
4/15/2020 18:15	0	4/16/2020 4:15	284.8030092	4/16/2020 14:15	0
4/15/2020 18:30	0	4/16/2020 4:30	296.4168483	4/16/2020 14:30	0
4/15/2020 18:45	0	4/16/2020 4:45	286.1227636	4/16/2020 14:45	0
4/15/2020 19:00	0	4/16/2020 5:00	265.5345943	4/16/2020 15:00	0
4/15/2020 19:15	0	4/16/2020 5:15	264.7427416	4/16/2020 15:15	0
4/15/2020 19:30	18.21261134	4/16/2020 5:30	258.9358221	4/16/2020 15:30	0
4/15/2020 19:45	109.5396189	4/16/2020 5:45	270.2857103	4/16/2020 15:45	0
4/15/2020 20:00	180.2784572	4/16/2020 6:00	244.6824741	4/16/2020 16:00	0
4/15/2020 20:15	208.7851532	4/16/2020 6:15	267.1182996	4/16/2020 16:15	0
4/15/2020 20:30	289.0262234	4/16/2020 6:30	269.2299067	4/16/2020 16:30	0
4/15/2020 20:45	532.9168448	4/16/2020 6:45	296.4168483	4/16/2020 16:45	0
4/15/2020 21:00	601.5440759	4/16/2020 7:00	304.5993259	4/16/2020 17:00	0
4/15/2020 21:15	685.4804586	4/16/2020 7:15	317.7968703	4/16/2020 17:15	0
4/15/2020 21:30	722.4335831	4/16/2020 7:30	294.5691921	4/16/2020 17:30	0
4/15/2020 21:45	786.5736491	4/16/2020 7:45	282.6914021	4/16/2020 17:45	0
4/15/2020 22:00	808.217622	4/16/2020 8:00	241.7790143	4/16/2020 18:00	0
4/15/2020 22:15	864.4391613	4/16/2020 8:15	206.6735461	4/16/2020 18:15	0
4/15/2020 22:30	898.7527769	4/16/2020 8:30	172.6238814	4/16/2020 18:30	0
4/15/2020 22:45	897.6969734	4/16/2020 8:45	159.4263369	4/16/2020 18:45	0
4/15/2020 23:00	883.7075762	4/16/2020 9:00	144.909038	4/16/2020 19:00	0
4/15/2020 23:15	863.6473087	4/16/2020 9:15	154.6752209	4/16/2020 19:15	0
4/15/2020 23:30	606.0312411	4/16/2020 9:30	168.9285689	4/16/2020 19:30	0
4/15/2020 23:45	591.2499913	4/16/2020 9:45	65.72377135	4/16/2020 19:45	0
4/16/2020 0:00	586.7628262	4/16/2020 10:00	50.1506689	4/16/2020 20:00	0
4/16/2020 0:15	539.515617	4/16/2020 10:15	8.182477558	4/16/2020 20:15	0
4/16/2020 0:30	529.7494341	4/16/2020 10:30	0	4/16/2020 20:30	0
4/16/2020 0:45	506.7857068	4/16/2020 10:45	0	4/16/2020 20:45	0
4/16/2020 1:00	500.1869346	4/16/2020 11:00	0	4/16/2020 21:00	0
4/16/2020 1:15	513.6484299	4/16/2020 11:15	0	4/16/2020 21:15	0
4/16/2020 1:30	505.4659524	4/16/2020 11:30	0	4/16/2020 21:30	0
4/16/2020 1:45	495.1718677	4/16/2020 11:45	0	4/16/2020 21:45	0
4/16/2020 2:00	485.9335866	4/16/2020 12:00	0	4/16/2020 22:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
4/16/2020 22:15	0
4/16/2020 22:30	0
4/16/2020 22:45	0
4/16/2020 23:00	0
4/16/2020 23:15	0
4/16/2020 23:30	0
4/16/2020 23:45	0
4/17/2020 0:00	0
4/17/2020 0:15	0
4/17/2020 0:30	0
4/17/2020 0:45	0
4/17/2020 1:00	0
4/17/2020 1:15	0
4/17/2020 1:30	0
4/17/2020 1:45	0
4/17/2020 2:00	0
4/17/2020 2:15	0
4/17/2020 2:30	0
4/17/2020 2:45	0
4/17/2020 3:00	0
4/17/2020 3:15	0
4/17/2020 3:30	0
4/17/2020 3:45	0
4/17/2020 4:00	0
4/17/2020 4:15	0
4/17/2020 4:30	0
4/17/2020 4:45	0
4/17/2020 5:00	0
4/17/2020 5:15	0
4/17/2020 5:30	0
4/17/2020 5:45	0
4/17/2020 6:00	0
4/17/2020 6:15	0
4/17/2020 6:30	0
4/17/2020 6:45	0
4/17/2020 7:00	0
4/17/2020 7:15	0
4/17/2020 7:30	0
4/17/2020 7:45	0
4/17/2020 8:00	0

Date and Time	Volume (Gal)
4/17/2020 8:15	0
4/17/2020 8:30	0
4/17/2020 8:45	0
4/17/2020 9:00	0
4/17/2020 9:15	0
4/17/2020 9:30	0
4/17/2020 9:45	0
4/17/2020 10:00	0
4/17/2020 10:15	0
4/17/2020 10:30	0
4/17/2020 10:45	0
4/17/2020 11:00	0
4/17/2020 11:15	0
4/17/2020 11:30	0
4/17/2020 11:45	0
4/17/2020 12:00	0
4/17/2020 12:15	0
4/17/2020 12:30	0
4/17/2020 12:45	0
4/17/2020 13:00	0
4/17/2020 13:15	0
4/17/2020 13:30	0
4/17/2020 13:45	0
4/17/2020 14:00	0
4/17/2020 14:15	0
4/17/2020 14:30	0
4/17/2020 14:45	0
4/17/2020 15:00	0
4/17/2020 15:15	0
4/17/2020 15:30	0
4/17/2020 15:45	0
4/17/2020 16:00	0
4/17/2020 16:15	0
4/17/2020 16:30	0
4/17/2020 16:45	0
4/17/2020 17:00	0
4/17/2020 17:15	0
4/17/2020 17:30	0
4/17/2020 17:45	0
4/17/2020 18:00	0

Date and Time	Volume (Gal)
4/17/2020 18:15	0
4/17/2020 18:30	0
4/17/2020 18:45	0
4/17/2020 19:00	0
4/17/2020 19:15	0
4/17/2020 19:30	0
4/17/2020 19:45	0
4/17/2020 20:00	0
4/17/2020 20:15	0
4/17/2020 20:30	0
4/17/2020 20:45	0
4/17/2020 21:00	0
4/17/2020 21:15	0
4/17/2020 21:30	0
4/17/2020 21:45	0
4/17/2020 22:00	0
4/17/2020 22:15	0
4/17/2020 22:30	0
4/17/2020 22:45	0
4/17/2020 23:00	0
4/17/2020 23:15	0
4/17/2020 23:30	0
4/17/2020 23:45	0
4/18/2020 0:00	0
4/18/2020 0:15	0
4/18/2020 0:30	0
4/18/2020 0:45	0
4/18/2020 1:00	0
4/18/2020 1:15	0
4/18/2020 1:30	0
4/18/2020 1:45	0
4/18/2020 2:00	0
4/18/2020 2:15	0
4/18/2020 2:30	0
4/18/2020 2:45	0
4/18/2020 3:00	0
4/18/2020 3:15	0
4/18/2020 3:30	0
4/18/2020 3:45	0
4/18/2020 4:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/18/2020 4:15	0	4/18/2020 14:15	0	4/19/2020 0:15	0
4/18/2020 4:30	0	4/18/2020 14:30	0	4/19/2020 0:30	0
4/18/2020 4:45	0	4/18/2020 14:45	0	4/19/2020 0:45	0
4/18/2020 5:00	0	4/18/2020 15:00	0	4/19/2020 1:00	0
4/18/2020 5:15	0	4/18/2020 15:15	0	4/19/2020 1:15	0
4/18/2020 5:30	0	4/18/2020 15:30	0	4/19/2020 1:30	0
4/18/2020 5:45	0	4/18/2020 15:45	0	4/19/2020 1:45	0
4/18/2020 6:00	0	4/18/2020 16:00	0	4/19/2020 2:00	0
4/18/2020 6:15	0	4/18/2020 16:15	0	4/19/2020 2:15	0
4/18/2020 6:30	0	4/18/2020 16:30	0	4/19/2020 2:30	0
4/18/2020 6:45	0	4/18/2020 16:45	0	4/19/2020 2:45	0
4/18/2020 7:00	0	4/18/2020 17:00	0	4/19/2020 3:00	0
4/18/2020 7:15	0	4/18/2020 17:15	0	4/19/2020 3:15	0
4/18/2020 7:30	0	4/18/2020 17:30	0	4/19/2020 3:30	0
4/18/2020 7:45	0	4/18/2020 17:45	0	4/19/2020 3:45	0
4/18/2020 8:00	0	4/18/2020 18:00	0	4/19/2020 4:00	0
4/18/2020 8:15	0	4/18/2020 18:15	0	4/19/2020 4:15	0
4/18/2020 8:30	0	4/18/2020 18:30	0	4/19/2020 4:30	0
4/18/2020 8:45	0	4/18/2020 18:45	0	4/19/2020 4:45	0
4/18/2020 9:00	0	4/18/2020 19:00	0	4/19/2020 5:00	0
4/18/2020 9:15	0	4/18/2020 19:15	0	4/19/2020 5:15	0
4/18/2020 9:30	0	4/18/2020 19:30	0	4/19/2020 5:30	0
4/18/2020 9:45	0	4/18/2020 19:45	0	4/19/2020 5:45	0
4/18/2020 10:00	0	4/18/2020 20:00	0	4/19/2020 6:00	0
4/18/2020 10:15	0	4/18/2020 20:15	0	4/19/2020 6:15	0
4/18/2020 10:30	0	4/18/2020 20:30	0	4/19/2020 6:30	0
4/18/2020 10:45	0	4/18/2020 20:45	0	4/19/2020 6:45	0
4/18/2020 11:00	0	4/18/2020 21:00	0	4/19/2020 7:00	0
4/18/2020 11:15	0	4/18/2020 21:15	0	4/19/2020 7:15	0
4/18/2020 11:30	0	4/18/2020 21:30	0	4/19/2020 7:30	0
4/18/2020 11:45	0	4/18/2020 21:45	0	4/19/2020 7:45	0
4/18/2020 12:00	0	4/18/2020 22:00	0	4/19/2020 8:00	0
4/18/2020 12:15	0	4/18/2020 22:15	0	4/19/2020 8:15	0
4/18/2020 12:30	0	4/18/2020 22:30	0	4/19/2020 8:30	0
4/18/2020 12:45	0	4/18/2020 22:45	0	4/19/2020 8:45	0
4/18/2020 13:00	0	4/18/2020 23:00	0	4/19/2020 9:00	0
4/18/2020 13:15	0	4/18/2020 23:15	0	4/19/2020 9:15	0
4/18/2020 13:30	0	4/18/2020 23:30	0	4/19/2020 9:30	0
4/18/2020 13:45	0	4/18/2020 23:45	0	4/19/2020 9:45	0
4/18/2020 14:00	0	4/19/2020 0:00	0	4/19/2020 10:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/19/2020 10:15	0	4/19/2020 20:15	0	4/20/2020 6:15	0
4/19/2020 10:30	0	4/19/2020 20:30	0	4/20/2020 6:30	0
4/19/2020 10:45	0	4/19/2020 20:45	0	4/20/2020 6:45	0
4/19/2020 11:00	0	4/19/2020 21:00	0	4/20/2020 7:00	0
4/19/2020 11:15	0	4/19/2020 21:15	0	4/20/2020 7:15	0
4/19/2020 11:30	0	4/19/2020 21:30	0	4/20/2020 7:30	0
4/19/2020 11:45	0	4/19/2020 21:45	0	4/20/2020 7:45	0
4/19/2020 12:00	0	4/19/2020 22:00	0	4/20/2020 8:00	0
4/19/2020 12:15	0	4/19/2020 22:15	0	4/20/2020 8:15	0
4/19/2020 12:30	0	4/19/2020 22:30	0	4/20/2020 8:30	0
4/19/2020 12:45	0	4/19/2020 22:45	0	4/20/2020 8:45	0
4/19/2020 13:00	0	4/19/2020 23:00	0	4/20/2020 9:00	0
4/19/2020 13:15	0	4/19/2020 23:15	0	4/20/2020 9:15	0
4/19/2020 13:30	0	4/19/2020 23:30	0	4/20/2020 9:30	0
4/19/2020 13:45	0	4/19/2020 23:45	0	4/20/2020 9:45	0
4/19/2020 14:00	0	4/20/2020 0:00	0	4/20/2020 10:00	0
4/19/2020 14:15	0	4/20/2020 0:15	0	4/20/2020 10:15	0
4/19/2020 14:30	0	4/20/2020 0:30	0	4/20/2020 10:30	0
4/19/2020 14:45	0	4/20/2020 0:45	0	4/20/2020 10:45	0
4/19/2020 15:00	0	4/20/2020 1:00	0	4/20/2020 11:00	0
4/19/2020 15:15	0	4/20/2020 1:15	0	4/20/2020 11:15	0
4/19/2020 15:30	0	4/20/2020 1:30	0	4/20/2020 11:30	0
4/19/2020 15:45	0	4/20/2020 1:45	0	4/20/2020 11:45	0
4/19/2020 16:00	0	4/20/2020 2:00	0	4/20/2020 12:00	0
4/19/2020 16:15	0	4/20/2020 2:15	0	4/20/2020 12:15	0
4/19/2020 16:30	0	4/20/2020 2:30	0	4/20/2020 12:30	0
4/19/2020 16:45	0	4/20/2020 2:45	0	4/20/2020 12:45	0
4/19/2020 17:00	0	4/20/2020 3:00	0	4/20/2020 13:00	0
4/19/2020 17:15	0	4/20/2020 3:15	0	4/20/2020 13:15	0
4/19/2020 17:30	0	4/20/2020 3:30	0	4/20/2020 13:30	0
4/19/2020 17:45	0	4/20/2020 3:45	0	4/20/2020 13:45	0
4/19/2020 18:00	0	4/20/2020 4:00	0	4/20/2020 14:00	0
4/19/2020 18:15	0	4/20/2020 4:15	0	4/20/2020 14:15	0
4/19/2020 18:30	0	4/20/2020 4:30	0	4/20/2020 14:30	0
4/19/2020 18:45	0	4/20/2020 4:45	0	4/20/2020 14:45	0
4/19/2020 19:00	0	4/20/2020 5:00	0	4/20/2020 15:00	0
4/19/2020 19:15	0	4/20/2020 5:15	0	4/20/2020 15:15	0
4/19/2020 19:30	0	4/20/2020 5:30	0	4/20/2020 15:30	0
4/19/2020 19:45	0	4/20/2020 5:45	0	4/20/2020 15:45	0
4/19/2020 20:00	0	4/20/2020 6:00	0	4/20/2020 16:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)	Date and Time	Volume (Gal)	Date and Time	Volume (Gal)
4/20/2020 16:15	0	4/21/2020 2:15	0	4/21/2020 12:15	0
4/20/2020 16:30	0	4/21/2020 2:30	0	4/21/2020 12:30	0
4/20/2020 16:45	0	4/21/2020 2:45	0	4/21/2020 12:45	0
4/20/2020 17:00	0	4/21/2020 3:00	0	4/21/2020 13:00	0
4/20/2020 17:15	0	4/21/2020 3:15	0	4/21/2020 13:15	0
4/20/2020 17:30	0	4/21/2020 3:30	0	4/21/2020 13:30	0
4/20/2020 17:45	0	4/21/2020 3:45	0	4/21/2020 13:45	0
4/20/2020 18:00	0	4/21/2020 4:00	0	4/21/2020 14:00	0
4/20/2020 18:15	0	4/21/2020 4:15	0	4/21/2020 14:15	0
4/20/2020 18:30	0	4/21/2020 4:30	0	4/21/2020 14:30	0
4/20/2020 18:45	0	4/21/2020 4:45	0	4/21/2020 14:45	0
4/20/2020 19:00	0	4/21/2020 5:00	0	4/21/2020 15:00	0
4/20/2020 19:15	0	4/21/2020 5:15	0	4/21/2020 15:15	0
4/20/2020 19:30	0	4/21/2020 5:30	0	4/21/2020 15:30	0
4/20/2020 19:45	0	4/21/2020 5:45	0	4/21/2020 15:45	0
4/20/2020 20:00	0	4/21/2020 6:00	0	4/21/2020 16:00	0
4/20/2020 20:15	0	4/21/2020 6:15	0	4/21/2020 16:15	0
4/20/2020 20:30	0	4/21/2020 6:30	0	4/21/2020 16:30	0
4/20/2020 20:45	0	4/21/2020 6:45	0	4/21/2020 16:45	0
4/20/2020 21:00	0	4/21/2020 7:00	0	4/21/2020 17:00	0
4/20/2020 21:15	0	4/21/2020 7:15	0	4/21/2020 17:15	0
4/20/2020 21:30	0	4/21/2020 7:30	0	4/21/2020 17:30	0
4/20/2020 21:45	0	4/21/2020 7:45	0	4/21/2020 17:45	0
4/20/2020 22:00	0	4/21/2020 8:00	0	4/21/2020 18:00	0
4/20/2020 22:15	0	4/21/2020 8:15	0	4/21/2020 18:15	0
4/20/2020 22:30	0	4/21/2020 8:30	0	4/21/2020 18:30	0
4/20/2020 22:45	0	4/21/2020 8:45	0	4/21/2020 18:45	0
4/20/2020 23:00	0	4/21/2020 9:00	0	4/21/2020 19:00	0
4/20/2020 23:15	0	4/21/2020 9:15	0	4/21/2020 19:15	0
4/20/2020 23:30	0	4/21/2020 9:30	0	4/21/2020 19:30	0
4/20/2020 23:45	0	4/21/2020 9:45	0	4/21/2020 19:45	0
4/21/2020 0:00	0	4/21/2020 10:00	0	4/21/2020 20:00	0
4/21/2020 0:15	0	4/21/2020 10:15	0	4/21/2020 20:15	0
4/21/2020 0:30	0	4/21/2020 10:30	0	4/21/2020 20:30	0
4/21/2020 0:45	0	4/21/2020 10:45	0	4/21/2020 20:45	0
4/21/2020 1:00	0	4/21/2020 11:00	0	4/21/2020 21:00	0
4/21/2020 1:15	0	4/21/2020 11:15	0	4/21/2020 21:15	0
4/21/2020 1:30	0	4/21/2020 11:30	0	4/21/2020 21:30	0
4/21/2020 1:45	0	4/21/2020 11:45	0	4/21/2020 21:45	0
4/21/2020 2:00	0	4/21/2020 12:00	0	4/21/2020 22:00	0

Chimney Rock Village Flow Meter Data

Date and Time	Volume (Gal)
4/21/2020 22:15	0
4/21/2020 22:30	0
4/21/2020 22:45	0
4/21/2020 23:00	0
4/21/2020 23:15	0
4/21/2020 23:30	0
4/21/2020 23:45	0
4/22/2020 0:00	0

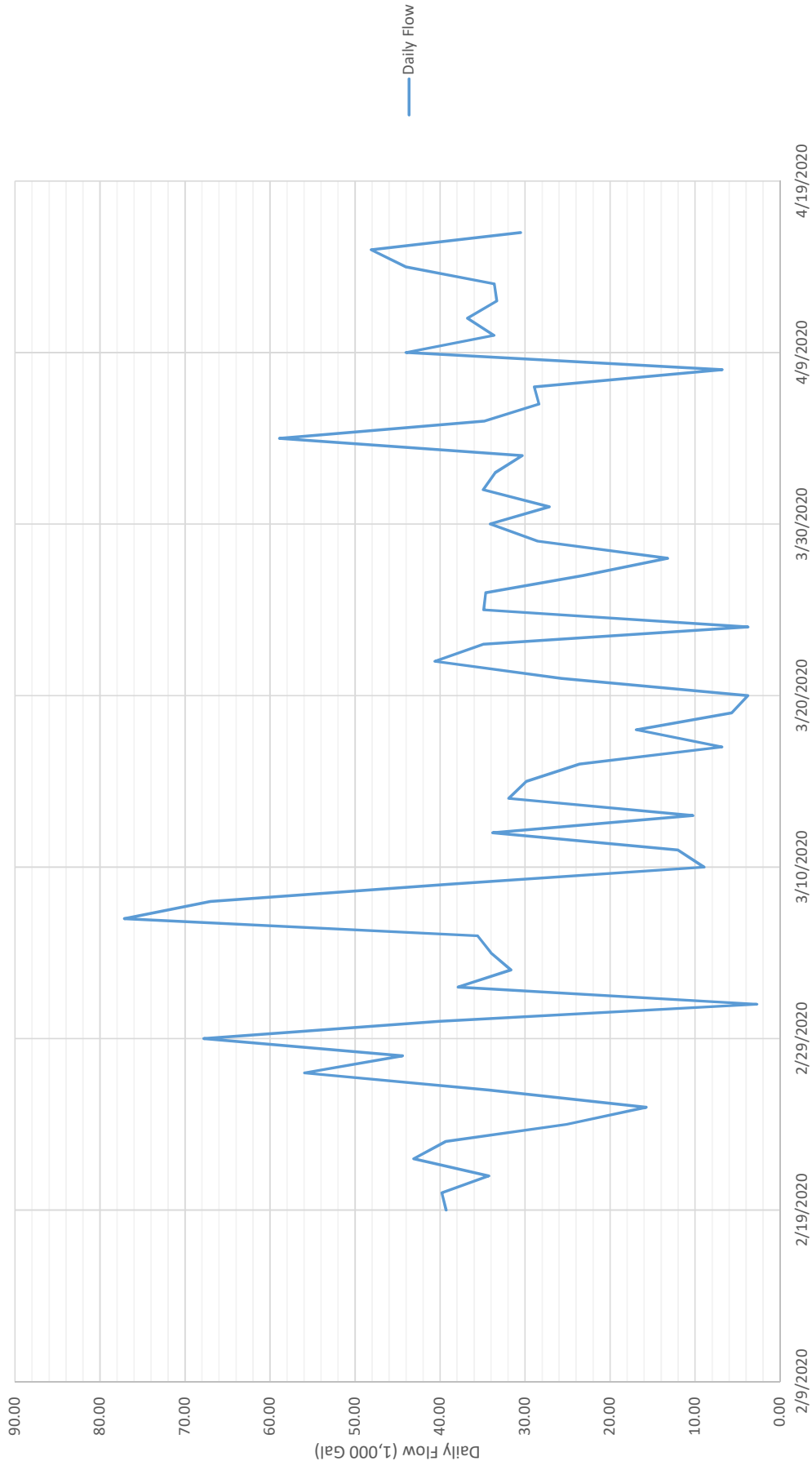
CRV Flow Meter

Begin Date	2/19/2020
End Date	4/22/2020
Interval of measurement	15 min
Number of Measurements	3418 EA
Average Daily Flow	31884.77 gpd
Max Average Daily Flow	77143.59 gpd
Max Hourly Flow	201.71 gpm
Peaking Factor	9.11
Population Equivalent Ratio	100 gpcd
Population Equivalent	319

Previous Metering by McGill

Max Observed Flow (15m interval)	2030 Gal
Peak Flow	135.33333 GPM
ADF	12.23 GPM
Peaking Factor	11.07

Chimney Rock Village Daily Flow



Lake Lure WWTP Flow Data
August 1, 2020 to March 17, 2021

Date	Flow		
8/1/2020	0.5862	9/10/2020	0.5606
8/2/2020	0.5862	9/11/2020	0.5071
8/3/2020	0.5862	9/12/2020	0.6349
8/4/2020	0.8842	9/13/2020	0.6349
8/5/2020	0.6587	9/14/2020	0.6349
8/6/2020	0.6675	9/15/2020	0.6313
8/7/2020	0.6239	9/16/2020	0.5286
8/8/2020	0.5513	9/17/2020	0.5054
8/9/2020	0.5513	9/18/2020	0.9062
8/10/2020	0.5513	9/19/2020	0.8062
8/11/2020	0.5332	9/20/2020	0.8062
8/12/2020	0.5256	9/21/2020	0.8062
8/13/2020	0.5398	9/22/2020	0.6774
8/14/2020	0.5804	9/23/2020	0.5519
8/15/2020	0.5804	9/24/2020	0.6501
8/16/2020	0.5809	9/25/2020	0.8094
8/17/2020	0.5809	9/26/2020	0.6927
8/18/2020	0.4867	9/27/2020	0.6927
8/19/2020	0.5023	9/28/2020	0.6927
8/20/2020	0.6385	9/29/2020	0.5883
8/21/2020	0.6857	9/30/2020	0.5577
8/22/2020	0.8596	10/1/2020	0.541
8/23/2020	0.8596	10/2/2020	0.4443
8/24/2020	0.8596	10/3/2020	0.5724
8/25/2020	0.5816	10/4/2020	0.5724
8/26/2020	0.6765	10/5/2020	0.5724
8/27/2020	0.5896	10/6/2020	0.6262
8/28/2020	0.593	10/7/2020	0.5123
8/29/2020	0.6159	10/8/2020	0.5001
8/30/2020	0.6159	10/9/2020	0.5289
8/31/2020	0.6159	10/10/2020	0.9055
9/1/2020	0.594	10/11/2020	0.6055
9/2/2020	0.6011	10/12/2020	0.6055
9/3/2020	0.6622	10/13/2020	0.7526
9/4/2020	0.5669	10/14/2020	0.6964
9/5/2020	0.6002	10/15/2020	0.5834
9/6/2020	0.6002	10/16/2020	0.5283
9/7/2020	0.6002	10/17/2020	0.573
9/8/2020	0.6002	10/18/2020	0.5734
9/9/2020	0.4657	10/19/2020	0.5734
		10/20/2020	0.5368

Lake Lure WWTP Flow Data
August 1, 2020 to March 17, 2021

10/21/2020	0.489
10/22/2020	0.5515
10/23/2020	0.4977
10/24/2020	0.5017
10/25/2020	0.5017
10/26/2020	0.5017
10/27/2020	0.4547
10/28/2020	0.427
10/29/2020	0.4271
10/30/2020	0.4274
10/31/2020	0.7143
11/1/2020	0.7143
11/2/2020	0.7143
11/3/2020	0.482
11/4/2020	0.4744
11/5/2020	0.5895
11/6/2020	0.4902
11/7/2020	0.5341
11/8/2020	0.5341
11/9/2020	0.5341
11/10/2020	0.5066
11/11/2020	0.5715
11/12/2020	0.7449
11/13/2020	0.6643
11/14/2020	0.5489
11/15/2020	0.5489
11/16/2020	0.5489
11/17/2020	0.4986
11/18/2020	0.5229
11/19/2020	0.5167
11/20/2020	0.4436
11/21/2020	0.5108
11/22/2020	0.5108
11/23/2020	0.5108
11/24/2020	0.4645
11/25/2020	0.4149
11/27/2020	0.5307
11/28/2020	0.5179
11/29/2020	0.5179
11/30/2020	0.5179
12/1/2020	0.4698

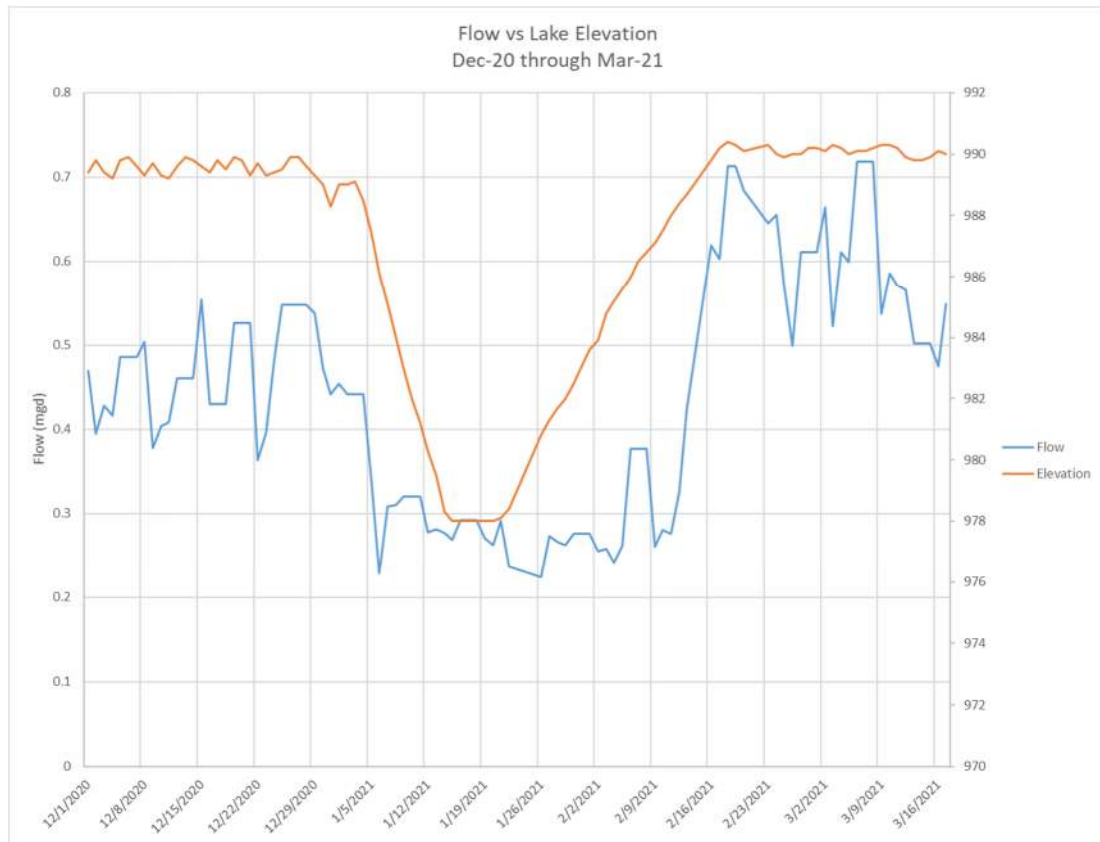
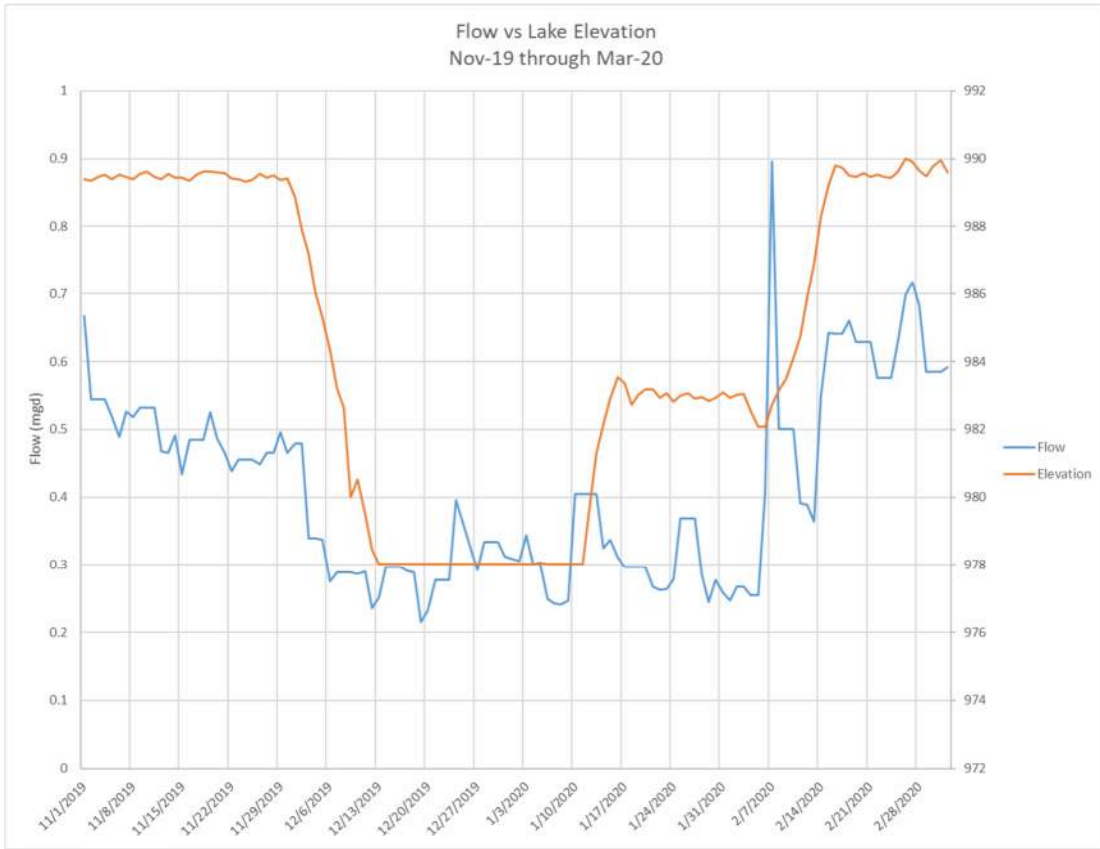
12/2/2020	0.3949
12/3/2020	0.4278
12/4/2020	0.4165
12/5/2020	0.486
12/6/2020	0.486
12/7/2020	0.486
12/8/2020	0.5038
12/9/2020	0.3781
12/10/2020	0.4036
12/11/2020	0.4085
12/12/2020	0.4609
12/13/2020	0.4609
12/14/2020	0.4609
12/15/2020	0.5542
12/16/2020	0.4299
12/17/2020	0.4302
12/18/2020	0.4302
12/19/2020	0.5266
12/20/2020	0.5266
12/21/2020	0.5266
12/22/2020	0.3635
12/23/2020	0.3961
12/24/2020	0.4845
12/25/2020	0.5478
12/26/2020	0.5478
12/27/2020	0.5478
12/28/2020	0.5478
12/29/2020	0.5379
12/30/2020	0.472
12/31/2020	0.4418
1/1/2021	0.4545
1/2/2021	0.4418
1/3/2021	0.4418
1/4/2021	0.4418
1/5/2021	0.3361
1/6/2021	0.2279
1/7/2021	0.3087
1/8/2021	0.3098
1/9/2021	0.3198
1/10/2021	0.3198
1/11/2021	0.3198

Lake Lure WWTP Flow Data
August 1, 2020 to March 17, 2021

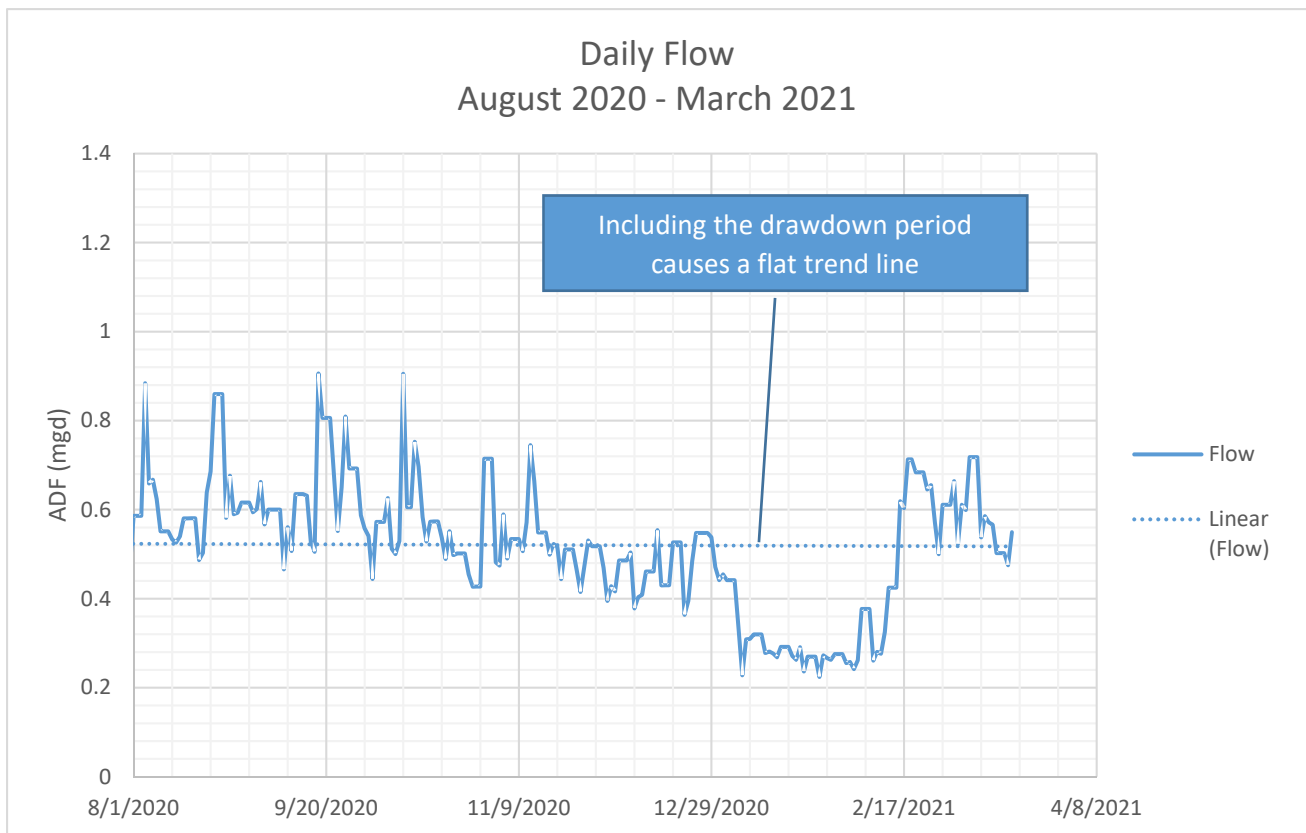
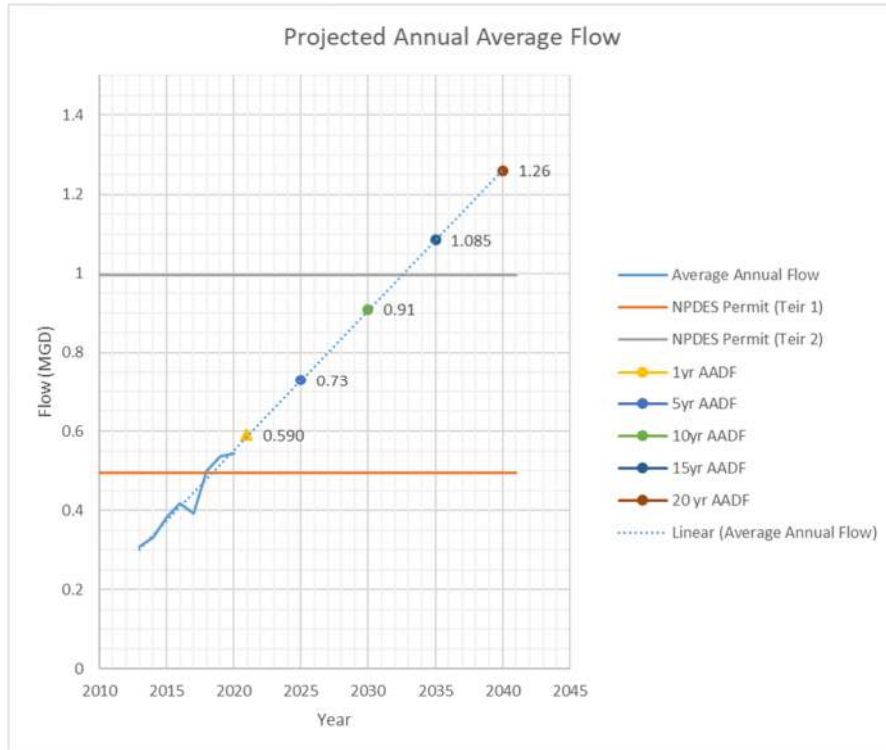
1/12/2021	0.2776
1/13/2021	0.2814
1/14/2021	0.2767
1/15/2021	0.2685
1/16/2021	0.2917
1/17/2021	0.2917
1/18/2021	0.2917
1/19/2021	0.2709
1/20/2021	0.2626
1/21/2021	0.2909
1/22/2021	0.2362
1/23/2021	0.2697
1/24/2021	0.2697
1/25/2021	0.2697
1/26/2021	0.224
1/27/2021	0.2728
1/28/2021	0.2664
1/29/2021	0.2627
1/30/2021	0.2757
1/31/2021	0.2757
2/1/2021	0.2757
2/2/2021	0.2549
2/3/2021	0.2581
2/4/2021	0.2419
2/5/2021	0.2615
2/6/2021	0.377
2/7/2021	0.377
2/8/2021	0.377
2/9/2021	0.2609
2/10/2021	0.2807
2/11/2021	0.2763
2/12/2021	0.3253
2/13/2021	0.4248
2/14/2021	0.4248
2/15/2021	0.4248
2/16/2021	0.6189
2/17/2021	0.6034
2/18/2021	0.7129
2/19/2021	0.7129
2/20/2021	0.684
2/21/2021	0.684

2/22/2021	0.684
2/23/2021	0.6453
2/24/2021	0.6553
2/25/2021	0.5709
2/26/2021	0.4997
2/27/2021	0.611
2/28/2021	0.611
3/1/2021	0.611
3/2/2021	0.6643
3/3/2021	0.523
3/4/2021	0.611
3/5/2021	0.5992
3/6/2021	0.7182
3/7/2021	0.7182
3/8/2021	0.7182
3/9/2021	0.5375
3/10/2021	0.5855
3/11/2021	0.5713
3/12/2021	0.5665
3/13/2021	0.5025
3/14/2021	0.5025
3/15/2021	0.5025
3/16/2021	0.4752
3/17/2021	0.5493

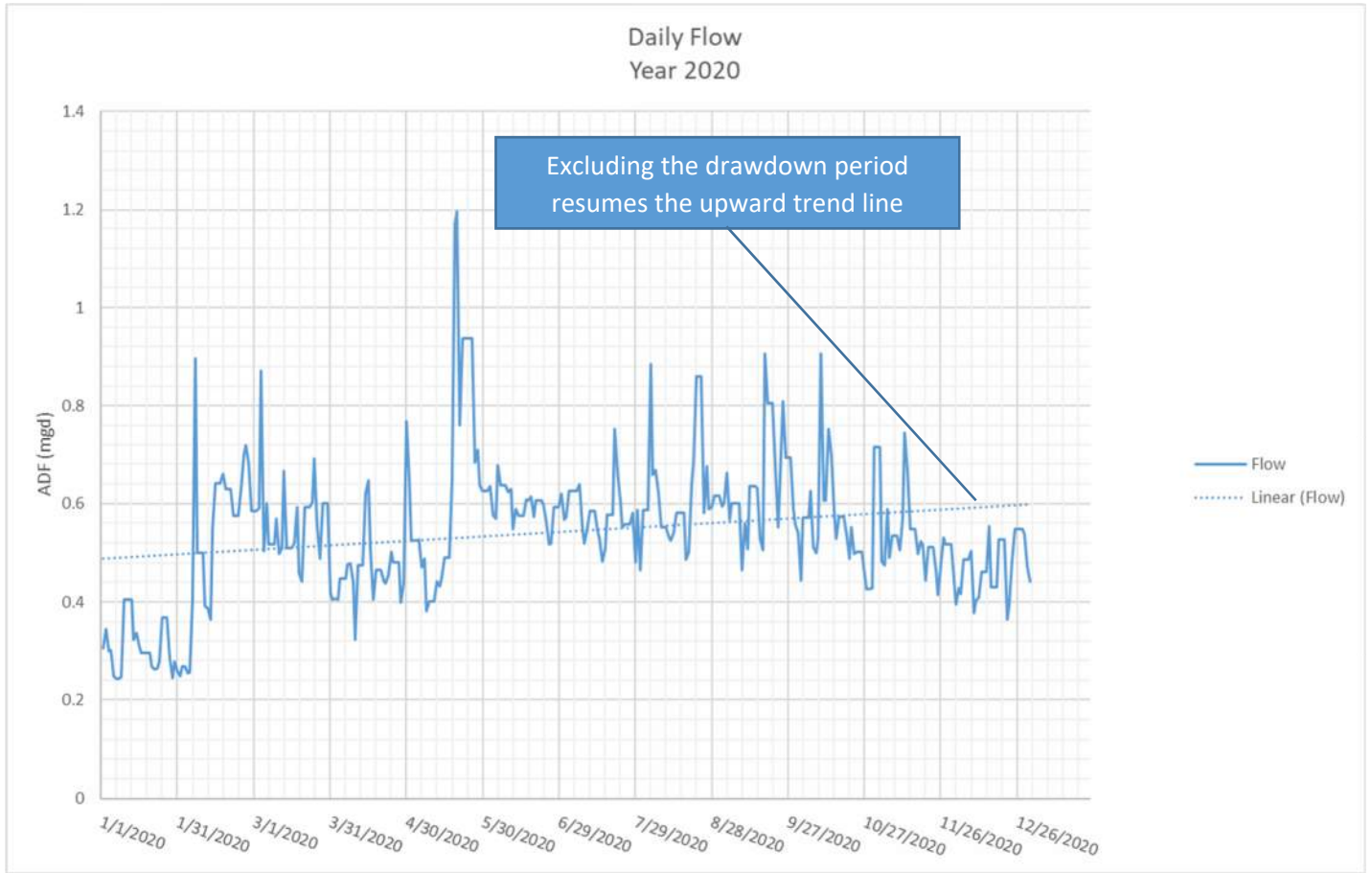
Lake Lure Flow Data Charts



Lake Lure Flow Data Charts

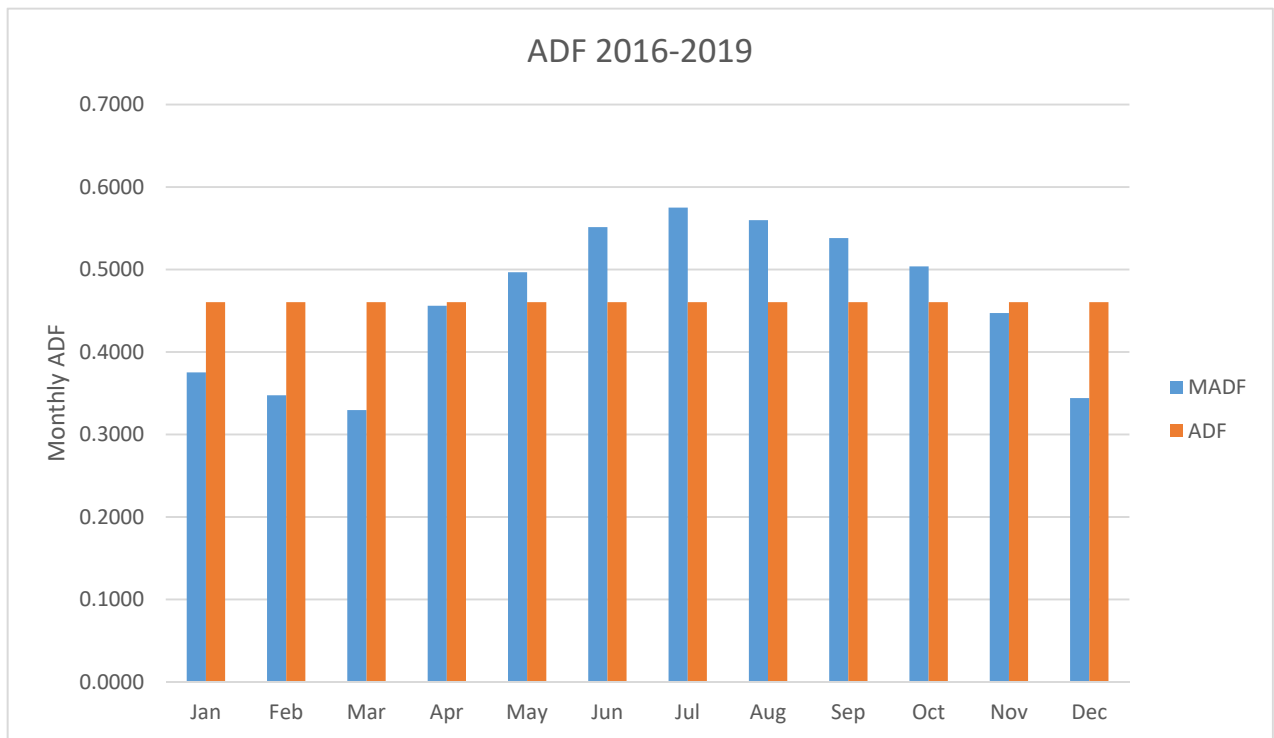


Lake Lure Flow Data Charts



Seasonal Peaking Factors 2016-2019

Month	MADF	ADF	Seasonal PF
Jan	0.3752	0.4604	0.81
Feb	0.3475	0.4604	0.75
Mar	0.3296	0.4604	0.72
Apr	0.4561	0.4604	0.99
May	0.4967	0.4604	1.08
Jun	0.5513	0.4604	1.20
Jul	0.5751	0.4604	1.25
Aug	0.5598	0.4604	1.22
Sep	0.5381	0.4604	1.17
Oct	0.5038	0.4604	1.09
Nov	0.4472	0.4604	0.97
Dec	0.3442	0.4604	0.75



APPENDIX E

Notice of Violations (NOVs)
Special Order of Consent (SOC) Application
NPDES Permit



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

Certified Mail # 7012 1010 0002 1965 7734

Return Receipt Requested

September 23, 2014

Chris Braund, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/DENR/DWR

SEP 26 2014

Water Quality
Permitting Section

SUBJECT: Notice of Violation and Assessment of Civil Penalty
for Violations of North Carolina General Statute (G.S.) 143-215.1(a)(6)
and NPDES Permit No. NC0025381
Town of Lake Lure
Lake Lure WWTP
Case No. LV-2014-0116
Rutherford County

Dear Permittee:

This letter transmits a Notice of Violation and assessment of civil penalty in the amount of \$1,147.50 (\$1,000.00 civil penalty + \$147.50 enforcement costs) against Town of Lake Lure.

This assessment is based upon the following facts: a review has been conducted of the discharge monitoring report (DMR) submitted by Town of Lake Lure for the month of January 2014. This review has shown the subject facility to be in violation of the discharge limitations and/or monitoring requirements found in NPDES Permit No. NC0025381. The violations, which occurred in January 2014, are summarized in Attachment A to this letter.

Based upon the above facts, I conclude as a matter of law that Town of Lake Lure violated the terms, conditions or requirements of NPDES Permit No. NC0025381 and G.S. 143-215.1(a)(6) in the manner and extent shown in Attachment A. In accordance with the maximums established by G.S. 143-215.6A(a)(2), a civil penalty may be assessed against any person who violates the terms, conditions or requirements of a permit required by G.S. 143-215.1(a).

Based upon the above findings of fact and conclusions of law, and in accordance with authority provided by the Secretary of the Department of Environment and Natural Resources and the Director of the Division of Water Resources, I, G. Landon Davidson, Regional Supervisor, Asheville Regional Office hereby make the following civil penalty assessment against Town of Lake Lure:

2090 U.S. 70 Highway, Swannanoa, NC 28778

Phone: 828-296-4500 \ Internet: www.ncdenr.gov <<http://www.ncdenr.gov>>

An Equal Opportunity \ Affirmative Action Employer - Made in part by recycled paper

<u>\$750.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>TSS - Conc.</u>
<u>\$250.00</u>	<u>1</u> of the <u>2</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Weekly Average for <u>TSS - Conc.</u>
<u>\$1,000.00</u>	TOTAL CIVIL PENALTY
<u>\$147.50</u>	Enforcement Costs
<u>\$1,147.50</u>	TOTAL AMOUNT DUE

Pursuant to G.S. 143-215.6A(c), in determining the amount of the penalty I have taken into account the Findings of Fact and Conclusions of Law and the factors set forth at G.S. 143B-282.1(b), which are:

- (1) The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;
- (2) The duration and gravity of the violation;
- (3) The effect on ground or surface water quantity or quality or on air quality;
- (4) The cost of rectifying the damage;
- (5) The amount of money saved by noncompliance;
- (6) Whether the violation was committed willfully or intentionally;
- (7) The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and
- (8) The cost to the State of the enforcement procedures.

Within **thirty (30) days** of receipt of this notice, you must do **one** of the following:

- (1) Submit payment of the penalty, **OR**
- (2) Submit a written request for remission, **OR**
- (3) Submit a written request for an administrative hearing

Option 1: Submit payment of the penalty:

Payment should be made directly to the order of the Department of Environment and Natural Resources (*do not include waiver form*). Payment of the penalty will not foreclose further enforcement action for any continuing or new violation(s). Please submit payment to the attention of:

NPDES Compliance/Enforcement Unit
 Division of Water Resources
 1617 Mail Service Center
 Raleigh, North Carolina 27699-1617

Option 2: Submit a written request for remission or mitigation including a detailed justification for such request:

Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Because a remission request forecloses the option of an administrative hearing, such a request must be accompanied by a waiver of your right to an administrative hearing and a stipulation and agreement that no factual or legal issues are in dispute. Please prepare a detailed statement that establishes why you believe the civil penalty should be remitted, and submit it to the Division of Water Resources at the address listed below. In determining whether a remission request will be approved, the following factors shall be considered:

- (1) whether one or more of the civil penalty assessment factors in NCGS 143B-282.1(b) was wrongfully applied to the detriment of the petitioner;
- (2) whether the violator promptly abated continuing environmental damage resulting from the violation;
- (3) whether the violation was inadvertent or a result of an accident;
- (4) whether the violator had been assessed civil penalties for any previous violations; or
- (5) whether payment of the civil penalty will prevent payment for the remaining necessary remedial actions.

Please note that all evidence presented in support of your request for remission must be submitted in writing. The Director of the Division of the Division of Water Resources will review your evidence and inform you of his decision in the matter of your remission request. The response will provide details regarding the case status, directions for payment, and provision for further appeal of the penalty to the Environmental Management Commission's Committee on Civil Penalty Remissions (Committee). Please be advised that the Committee cannot consider information that was not part of the original remission request considered by the Director. Therefore, it is very important that you prepare a complete and thorough statement in support of your request for remission.

In order to request remission, you must complete and submit the enclosed "Request for Remission of Civil Penalties, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form within thirty (30) days of receipt of this notice. The Division of Water Resources also requests that you complete and submit the enclosed "Justification for Remission Request."

Both forms should be submitted to the following address:

NPDES Compliance/Enforcement Unit
Division of Water Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Option 3: File a petition for an administrative hearing with the Office of Administrative Hearings:

If you wish to contest any statement in the attached assessment document you must file a petition for an administrative hearing. You may obtain the petition form from the Office of Administrative Hearings. You must file the petition with the Office of Administrative Hearings within thirty (30) days of receipt of this notice. A petition is considered filed when it is received in the Office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m., except for official state holidays. The petition may be filed by facsimile (fax) or electronic mail by an attached file (with restrictions) - provided the signed original, one (1) copy and a filing fee (if a filing fee is required by NCGS §150B-23.2) is received in the Office of Administrative Hearings within seven (7) business days following the faxed or electronic transmission. You should contact the Office of Administrative Hearings with all questions regarding the filing fee and/or the details of the filing process.

The mailing address and telephone and fax numbers for the Office of Administrative Hearings are as follows:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Tel: (919) 733-2698
Fax: (919) 733-3478

One (1) copy of the petition must also be served on DENR as follows:

Mr. John Evans, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center
Raleigh, North Carolina 27699-1601

Please indicate the case number (as found on page one of this letter) on the petition.

Failure to exercise one of the options above within thirty (30) days of receipt of this letter, as evidenced by an internal date/time received stamp (not a postmark), will result in this matter being referred to the Attorney General's Office for collection of the penalty through a civil action. Please be advised that additional penalties may be assessed for violations that occur after the review period of this assessment.

JUSTIFICATION FOR REMISSION REQUEST

Case Number: LV-2014-0116

County: Rutherford

Assessed Party: Town of Lake Lure

Permit No.: NC0025381

Amount Assessed: \$1,147.50

Please use this form when requesting remission of this civil penalty. You must also complete the "Request For Remission, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form to request remission of this civil penalty. You should attach any documents that you believe support your request and are necessary for the Director to consider in evaluating your request for remission. Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Pursuant to N.C.G.S. § 143B-282.1(c), remission of a civil penalty may be granted only when one or more of the following five factors apply. Please check each factor that you believe applies to your case and provide a detailed explanation, including copies of supporting documents, as to why the factor applies (attach additional pages as needed).

- (a) one or more of the civil penalty assessment factors in N.C.G.S. 143B-282.1(b) were wrongfully applied to the detriment of the petitioner *(the assessment factors are listed in the civil penalty assessment document)*;
- (b) the violator promptly abated continuing environmental damage resulting from the violation *(i.e., explain the steps that you took to correct the violation and prevent future occurrences)*;
- (c) the violation was inadvertent or a result of an accident *(i.e., explain why the violation was unavoidable or something you could not prevent or prepare for)*;
- (d) the violator had not been assessed civil penalties for any previous violations;
- (e) payment of the civil penalty will prevent payment for the remaining necessary remedial actions *(i.e., explain how payment of the civil penalty will prevent you from performing the activities necessary to achieve compliance)*.

EXPLANATION:

ATTACHMENT A

Town of Lake Lure

CASE NUMBER: LV-2014-0116

PERMIT: NC0025381 FACILITY: Lake Lure WWTP COUNTY: Rutherford REGION: Asheville

Limit Violations

PENALTY	MONITORING REPORT	OUTFALL/ PPI	LOCATION	PARAMETER	VIOLATION DATE	FREQUENCY	UNIT OF MEASURE	LIMIT	CALCULATED VALUE	% OVER LIMIT	VIOLATION TYPE
\$250.00	1-2014	001	Effluent	TSS - Conc	1/11/14	3 X week	mg/l	45	68.70	52.6	Weekly Average Exceeded
\$0.00	1-2014	001	Effluent	TSS - Conc	1/25/14	3 X week	mg/l	45	53.70	19.3	Weekly Average Exceeded
\$750.00	1-2014	001	Effluent	TSS - Conc	1/31/14	3 X week	mg/l	30	50	66.7	Monthly Average Exceeded

DIVISION OF WATER RESOURCES - CIVIL PENALTY ASSESSMENT (FILE)

Violator: Lake Lure WWTP / NC0025381

County: Rutherford

Case Number: LV-2014-0116

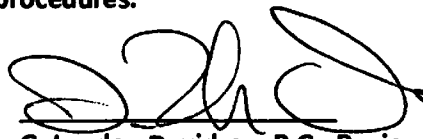
8 ASSESSMENT FACTORS

As required by G.S. 143-214.6A(c), in determining the amount of the penalty I considered the factors set out in G.S. 143B-282.1(b), which are:

- 1) **The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;**
All effluent violations may be detrimental to the receiving stream but may not be immediately quantified.
- 2) **The duration and gravity of the violation;**
Two Weekly Average TSS's exceeded the permit limit by 52.5% & 19.2%.
One Monthly Average TSS exceeded the permit limit by 66.6%.
- 3) **The effect on ground or surface water quantity or quality or on air quality;**
All effluent violations may be detrimental to the receiving stream but may not be immediately quantified.
- 4) **The cost of rectifying the damage;**
The cost is unknown.
- 5) **The amount of money saved by noncompliance;**
The amount of money saved would include the cost of excess solids removal and additional aeration. It would also include more operating and maintenance time on site.
- 6) **Whether the violation was committed willfully or intentionally;**
It does not appear to be either.
- 7) **The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and**
There have been no civil penalty enforcements in the twelve months prior to this violation.
- 8) **The cost to the State of the enforcement procedures.**
\$147.50.

9.23.2014

Date



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office, NCDENR

EFFLUENT

NPDES PERMIT NO. NC0025381 DISCHARGE NO 001 MONTH January YEAR 2014

FACILITY NAME Town of Lake Lure CLASS PC II COUNTY Rutherford

OPERATOR IN RESPONSIBLE CHARGE (ORC) Donald G. Byers GRADE IV 10939

CERTIFIED LABORATORIES (1) Environmental Testing Solutions # NC600 & Byers Environmental # 5641

CHECK BOX IF ORC HAS CHANGED

PERSONS COLLECTING SAMPLES

Sheridan Byers / Don Byers

Mail ORIGINAL and ONE COPY to:

ATTN: CENTRAL FILES

DIV. OF ENVIRONMENTAL MANAGEMENT

DEHNR

1617 Mail Service Center

RALEIGH, NC 27699-1617

X Donald G. Byers 3/29/2014
(SIGNATURE OF OPERATOR IN RESPONSIBLE CHARGE) DATE

BY THIS SIGNATURE, I CERTIFY THAT THE REPORT IS

ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

RECEIVED
Division of Water Resources

MAR 18 2014

Water Quality Regional Operations
Wilmington Regional Office

DATE	Operator Arrival Time: 2400 Clock	Operator Time On Site	ORC On Site?*	50050	00010	00400	50060	00310	00530	00610	31616	TGP3B	00300	01042	1032	01042	00720	
				FLOW	TEMPERATURE CELSIUS	pH	CHLORINE RESIDUAL	BODs 20 C	TOTAL SUSPENDED RESIDUE	AMMONIA NITROGEN	FECAL COLIFORM	(GEOMETRIC MEAN)	ACUTE TOXIC	D.O.	Copper	Zinc	Aluminum	Iron
	HRS	HRS	Y/N	DAILY RATE MGD	°C	UNITS	UG/L	MG/L	MG/L	MG/L	col /100ML	PIF	MG/L	MG/L	MG/L	mg/l	mg/l	
1	915	4.0	b	0.29692														
2	915	4.0	y	0.57424	10	6.6	< 28	8.3	32.0	16.0	< 2							
3	915	4.0	y	0.24275														
4	1000	1.0	b	0.20829														
5	1000	1.0	b	0.24615														
6	1025	4.0	b	0.25650	9	6.6	30	8.0	33.0	7.9	< 2					3.00	22	
7	915	4.0	b	0.22749														
8	1005	4.0	y	0.42048	9	6.5	< 28	7.0	85.0	7.6	< 2							
9	1005	4.0	y	0.21812	9	6.6	< 28	9.5	88.0	6.5	< 2							
10	915	4.0	y	0.22816														
11	915	1.0	b	0.29688														
12	915	1.0	b	0.49254														
13	915	4.0	b	0.30662														
14	0840	4.0	y	0.25347	9	6.5	< 28	4.2	33.0	6.5	< 2	PASS						
15	1000	4.0	b	0.26921	9	6.8	28	11.0	43.0	7.0	< 2						16	
16	0955	4.0	y	0.23599	9	6.8	< 28	10.0	53.0	6.0	< 2							
17	915	4.0	b	0.19706														
18	1000	1.0	b	0.24927														
19	1000	1.0	b	0.25034														
20	1040	4.0	b	0.25034	9	6.6	< 28	8.5	61.0	7.4	< 2					3.40	18	
21	1005	4.0	y	0.26978	9	6.3	< 28	6.5	53.0	6.9	< 2							
22	1042	4.0	y	0.22344	8	6.3	< 28	7.2	47.0	6.7	< 2							
23	915	4.0	b	0.20227														
24	915	4.0	y	0.19230														
25	915	1.0	b	0.19823														
26	1000	1.0	b	0.25192														
27	1015	4.0	b	0.24726	7	6.7	< 28	3.2	54.0	8.1	< 2					4.80	22	
28	934	4.0	y	0.22375	8	6.3	< 28	4.0	26.0	7.6	< 2							
29	915	4.0	b	0.21569														
30	1000	4.0	y	0.21574	6	6.3	< 28	6.2	42.0	6.5	< 2							
31	915	4.0	b	0.20541														
AVERAGE				0.26344	8.5		28.2	7.2	50.0	7.7	< 2	PASS				3.73	20	
MAXIMUM				0.57424	10.0	6.8	30	11.0	88	16.0	< 2	PASS				4.80	22	
MINIMUM				0.19230	6	6.3	28	3.2	26	6.0	< 2	PASS				3.00	16	
%REMOVAL																		
Comp. (C) Grab (G)				cont.	G	G	G	C	C	C	G	G	G	C	C	C	C	C
Monthly Limit				0.995		6-9	50	30	30		200							

RECEIVED
FEB 26 2014
CENTRAL FILES
DWQ/BOG

Handwritten: 4/3/14 NOV-2014-LM-0008 / 9/23/14 LV-2014-0116

5 FACILITY STATUS

Facility Status: (Please check one of the following)

All monitoring data and sampling frequencies meet permit requirements

Compliant

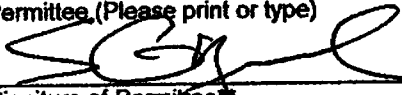
All monitoring data and sampling frequencies do NOT meet permit requirements

Noncompliant

If the facility is noncompliant, please comment on corrective actions being taken in respect to equipment, operation, maintenance, etc., and a time table for improvements to be made.

Due to ambient temperatures during this month dropping to near 0 degrees F. several times causing freezing chemical feed lines, including the aluminum sulfate feed line that is used to control the effluent TSS, the plant exceed the weekly maximum limit for TSS during 2 weeks and exceed the maximum monthly average for TSS. All chemical feed pumps and lines have been repaired or replaced and have been returned to normal operation.

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

Chris Braund, Town Manager
Permittee (Please print or type)

Signature of Permittee Date 26-Jan-14

PO Box 255, Lake Lure, NC 28746 828.625.9983 August 2013
Permittee Address Phone Number Permit Exp. Date

PARAMETER CODES

(File Copy)

9/18/2014
1

Permit Enforcement History Details by Owner

Owner : Town of Lake Lure
Facility : Lake Lure WWTP
Permit : NC0025381
Region : Asheville
County : Rutherford

Case Number	MR	Penalty Assessment Approved	Penalty Amount	Enforcement Costs	Damages	Remission Request Received	Enf Conf Held	Enf Remission Amount	EMC Hearing Held	EMC Remission Amount	OAH Remission Amount	Collection MemoSent To AGO	Total Paid	Balance Due	Has Pmt Plan	Case Closed
RV-1993-0044		6/11/93	\$250.00	\$0.00	\$0.00									\$0.00	No	7/1/93
DV-1997-0011		4/23/98	\$5,000.00	\$394.24		5/21/98	8/5/98	\$2000					\$3,394.24	\$0.00	No	10/7/98
CV-1998-0010		1/11/00	\$4,000.00	\$179.10									\$4,179.10	\$0.00	No	2/17/00
LV-2000-0332		8/8/00	\$1,250.00	\$105.50									\$1,355.50	\$0.00	No	8/25/00
LV-2000-0397		9/18/00	\$500.00	\$105.50									\$805.50	\$0.00	No	10/11/00
LV-2001-0240		7/8/01	\$1,000.00	\$105.50									\$1,105.50	\$0.00	No	10/8/01
LV-2002-0434		9/17/02	\$1,250.00	\$105.50									\$1,355.50	\$0.00	No	10/8/02
LV-2002-0438		9/17/02	\$250.00	\$105.50									\$355.50	\$0.00	No	10/8/02
LV-2002-0881		12/15/02	\$250.00	\$105.50									\$355.50	\$0.00	No	12/30/02
LV-2003-0612	6-2003	9/15/03	\$250.00	\$100.00									\$350.00	\$0.00	No	10/13/03
LV-2003-0778	9-2003	12/15/03	\$250.00	\$100.00									\$350.00	\$0.00	No	1/5/04
LV-2004-0204	10-2003	6/14/04	\$500.00	\$100.00									\$800.00	\$0.00	No	6/29/04
LV-2004-0923	5-2004	8/3/04	\$250.00	\$100.00									\$350.00	\$0.00	No	8/23/04
LV-2004-0437	6-2004	9/1/04	\$250.00	\$100.00									\$350.00	\$0.00	No	9/22/04
LV-2006-0335	2-2006	9/5/06	\$250.00	\$128.82									\$378.82	\$0.00	No	9/15/06
LV-2007-0032	7-2006	2/8/07	\$1,750.00	\$128.82									\$1,878.82	\$0.00	No	12/11/07

Case No.	Case Name	Date	Amount	Enforcement Cost	Penalty Amount	Sum of Total Paid	Total Enforcement Cost	Total Penalty Amount	Total Balance Due	Penalties After Remissions
LV-2007-0033	8-2006	2/6/07	\$2,000.00	\$128.62	\$2,128.62	\$2,128.62	\$0.00	\$0.00	\$0.00	No
LV-2007-0034	9-2006	2/6/07	\$2,000.00	\$128.62	\$2,128.82	\$2,128.82	\$0.00	\$0.00	\$0.00	No
LV-2007-0035	10-2006	2/9/07	\$1,500.00	\$128.82	\$1,628.82	\$1,628.82	\$0.00	\$0.00	\$0.00	No
LV-2007-0036	11-2006	2/9/07	\$2,500.00	\$126.62	\$1,676.62	\$1,676.62	\$0.00	\$0.00	\$0.00	No
SP-2008-0023	4-2006	12/2/06	\$3,500.00	\$0.00	\$3,500.00	\$3,500.00	\$0.00	\$0.00	\$0.00	No
SP-2008-0023	7-2006	12/2/06	\$3,500.00	\$0.00	\$3,500.00	\$3,500.00	\$0.00	\$0.00	\$0.00	No
SP-2008-0001	8-2006	1/5/09	\$2,000.00		\$2,000.00	\$2,000.00	\$0.00	\$0.00	\$0.00	No
LV-2010-0303	4-2010	9/6/10	\$750.00	\$87.00	\$837.00	\$837.00	\$0.00	\$0.00	\$0.00	No
LV-2010-0353	5-2010	10/25/10	\$1,000.00	\$87.00	\$1,087.00	\$1,087.00	\$0.00	\$0.00	\$0.00	No
LV-2010-0394	6-2010	11/30/10	\$1,000.00	\$87.00	\$1,087.00	\$1,087.00	\$0.00	\$0.00	\$0.00	No
LV-2011-0015	7-2010	1/13/11	\$2,250.00	\$87.00	\$2,337.00	\$2,337.00	\$0.00	\$0.00	\$0.00	No
LV-2011-0047	8-2010	2/22/11	\$2,250.00	\$87.00	\$2,337.00	\$2,337.00	\$0.00	\$0.00	\$0.00	No
LV-2011-0046	9-2010	2/22/11	\$1,562.50	\$87.00	\$1,649.50	\$1,649.50	\$0.00	\$0.00	\$0.00	No
LV-2011-0049	10-2010	2/22/11	\$1,250.00	\$87.00	\$1,337.00	\$1,337.00	\$0.00	\$0.00	\$0.00	No
LV-2011-0302	4-2011	11/21/11	\$1,125.00	\$142.00	\$1,267.00	\$1,267.00	\$0.00	\$0.00	\$0.00	No
LV-2014-0116	1-2014		\$0.00		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	No

Total Cases: 31 Sum of Total Paid: \$3078.26 Total Enforcement Cost: \$3078.26 Total Balance Due: \$10,981.50
 Sum of Total Case Penalties: \$46,515.76 Total Penalties After Remissions: \$45,315.76



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

Certified Mail # 7012 1010 0002 1965 7758

Return Receipt Requested

September 23, 2014

Chris Braund, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/DENR/DWR

SEP 26 2014

Water Quality
Permitting Section

SUBJECT: Notice of Violation and Assessment of Civil Penalty
for Violations of North Carolina General Statute (G.S.) 143-215.1(a)(6)
and NPDES Permit No. NC0025381
Town of Lake Lure
Lake Lure WWTP
Case No. LV-2014-0119
Rutherford County

Dear Permittee:

This letter transmits a Notice of Violation and assessment of civil penalty in the amount of \$1,897.50 (\$1,750.00 civil penalty + \$147.50 enforcement costs) against Town of Lake Lure.

This assessment is based upon the following facts: a review has been conducted of the discharge monitoring report (DMR) submitted by Town of Lake Lure for the month of April 2014. This review has shown the subject facility to be in violation of the discharge limitations and/or monitoring requirements found in NPDES Permit No. NC0025381. The violations, which occurred in April 2014, are summarized in Attachment A to this letter.

Based upon the above facts, I conclude as a matter of law that Town of Lake Lure violated the terms, conditions or requirements of NPDES Permit No. NC0025381 and G.S. 143-215.1(a)(6) in the manner and extent shown in Attachment A. In accordance with the maximums established by G.S. 143-215.6A(a)(2), a civil penalty may be assessed against any person who violates the terms, conditions or requirements of a permit required by G.S. 143-215.1(a).

Based upon the above findings of fact and conclusions of law, and in accordance with authority provided by the Secretary of the Department of Environment and Natural Resources and the Director of the Division of Water Resources, I, G. Landon Davidson, Regional Supervisor, Asheville Regional Office hereby make the following civil penalty assessment against Town of Lake Lure:

2090 U.S. 70 Highway, Swannanoa, NC 28778

Phone: 828-296-4500 \ Internet: www.ncdenr.gov <<http://www.ncdenr.gov>>

An Equal Opportunity \ Affirmative Action Employer - Made in part by recycled paper

<u>\$750.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>NH3-N - Conc.</u>
<u>\$750.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>TSS - Conc.</u>
<u>\$250.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Weekly Average for <u>TSS - Conc.</u>
<u>\$1,750.00</u>	TOTAL CIVIL PENALTY
<u>\$147.50</u>	Enforcement Costs
<u>\$1,897.50</u>	TOTAL AMOUNT DUE

Pursuant to G.S. 143-215.6A(c), in determining the amount of the penalty I have taken into account the Findings of Fact and Conclusions of Law and the factors set forth at G.S. 143B-282.1(b), which are:

- (1) The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;
- (2) The duration and gravity of the violation;
- (3) The effect on ground or surface water quantity or quality or on air quality;
- (4) The cost of rectifying the damage;
- (5) The amount of money saved by noncompliance;
- (6) Whether the violation was committed willfully or intentionally;
- (7) The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and
- (8) The cost to the State of the enforcement procedures.

Within **thirty (30) days** of receipt of this notice, you must do **one** of the following:

- (1) Submit payment of the penalty, **OR**
- (2) Submit a written request for remission, **OR**
- (3) Submit a written request for an administrative hearing

Option 1: Submit payment of the penalty:

Payment should be made directly to the order of the Department of Environment and Natural Resources (*do not include waiver form*). Payment of the penalty will not foreclose further enforcement action for any continuing or new violation(s). Please submit payment to the attention of:

NPDES Compliance/Enforcement Unit
 Division of Water Resources
 1617 Mail Service Center
 Raleigh, North Carolina 27699-1617

Option 2: Submit a written request for remission or mitigation including a detailed justification for such request:

Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Because a remission request forecloses the option of an administrative hearing, such a request must be accompanied by a waiver of your right to an administrative hearing and a stipulation and agreement that no factual or legal issues are in dispute. Please prepare a detailed statement that establishes why you believe the civil penalty should be remitted, and submit it to the Division of Water Resources at the address listed below. In determining whether a remission request will be approved, the following factors shall be considered:

- (1) whether one or more of the civil penalty assessment factors in NCGS 143B-282.1(b) was wrongfully applied to the detriment of the petitioner;
- (2) whether the violator promptly abated continuing environmental damage resulting from the violation;
- (3) whether the violation was inadvertent or a result of an accident;
- (4) whether the violator had been assessed civil penalties for any previous violations; or
- (5) whether payment of the civil penalty will prevent payment for the remaining necessary remedial actions.

Please note that all evidence presented in support of your request for remission must be submitted in writing. The Director of the Division of the Division of Water Resources will review your evidence and inform you of his decision in the matter of your remission request. The response will provide details regarding the case status, directions for payment, and provision for further appeal of the penalty to the Environmental Management Commission's Committee on Civil Penalty Remissions (Committee). Please be advised that the Committee cannot consider information that was not part of the original remission request considered by the Director. Therefore, it is very important that you prepare a complete and thorough statement in support of your request for remission.

In order to request remission, you must complete and submit the enclosed "Request for Remission of Civil Penalties, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form within thirty (30) days of receipt of this notice. The Division of Water Resources also requests that you complete and submit the enclosed "Justification for Remission Request."

Both forms should be submitted to the following address:

NPDES Compliance/Enforcement Unit
Division of Water Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Option 3: File a petition for an administrative hearing with the Office of Administrative Hearings:

If you wish to contest any statement in the attached assessment document you must file a petition for an administrative hearing. You may obtain the petition form from the Office of Administrative Hearings. You must file the petition with the Office of Administrative Hearings within thirty (30) days of receipt of this notice. A petition is considered filed when it is received in the Office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m., except for official state holidays. The petition may be filed by facsimile (fax) or electronic mail by an attached file (with restrictions) - provided the signed original, one (1) copy and a filing fee (if a filing fee is required by NCGS §150B-23.2) is received in the Office of Administrative Hearings within seven (7) business days following the faxed or electronic transmission. You should contact the Office of Administrative Hearings with all questions regarding the filing fee and/or the details of the filing process.

The mailing address and telephone and fax numbers for the Office of Administrative Hearings are as follows:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Tel: (919) 733-2698
Fax: (919) 733-3478

One (1) copy of the petition must also be served on DENR as follows:

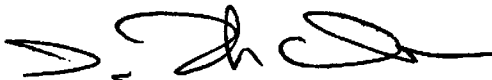
Mr. John Evans, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center
Raleigh, North Carolina 27699-1601

Please indicate the case number (as found on page one of this letter) on the petition.

Failure to exercise one of the options above within thirty (30) days of receipt of this letter, as evidenced by an internal date/time received stamp (not a postmark), will result in this matter being referred to the Attorney General's Office for collection of the penalty through a civil action. Please be advised that additional penalties may be assessed for violations that occur after the review period of this assessment.

If you have any questions, please contact Janet Cantwell with the Division of Water Resources staff of the Asheville Regional Office at (828) 296-4667 or via email at janet.cantwell@ncdenr.gov.

Sincerely,



for Thomas A. Reeder, Director
Division of Water Resources, NCDENR

By G. Landon Davidson, Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDENR

ATTACHMENTS

- Cc: WQS Asheville Regional Office - Enforcement File (w/attachments)
- c NPDES Compliance/Enforcement Unit - Enforcement File (w/attachments)
- Central Files, Water Quality Section (w/attachments)

RECEIVED/DENR/DWR

SEP 26 2014

Water Quality
Permitting Section

JUSTIFICATION FOR REMISSION REQUEST

Case Number: LV-2014-0119

County: Rutherford

Assessed Party: Town of Lake Lure

Permit No.: NC0025381

Amount Assessed: \$1,897.50

Please use this form when requesting remission of this civil penalty. You must also complete the "Request For Remission, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form to request remission of this civil penalty. You should attach any documents that you believe support your request and are necessary for the Director to consider in evaluating your request for remission. Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Pursuant to N.C.G.S. § 143B-282.1(c), remission of a civil penalty may be granted only when one or more of the following five factors apply. Please check each factor that you believe applies to your case and provide a detailed explanation, including copies of supporting documents, as to why the factor applies (attach additional pages as needed).

- (a) one or more of the civil penalty assessment factors in N.C.G.S. 143B-282.1(b) were wrongfully applied to the detriment of the petitioner (*the assessment factors are listed in the civil penalty assessment document*);

- (b) the violator promptly abated continuing environmental damage resulting from the violation (*i.e., explain the steps that you took to correct the violation and prevent future occurrences*);

- (c) the violation was inadvertent or a result of an accident (*i.e., explain why the violation was unavoidable or something you could not prevent or prepare for*);

- (d) the violator had not been assessed civil penalties for any previous violations;

- (e) payment of the civil penalty will prevent payment for the remaining necessary remedial actions (*i.e., explain how payment of the civil penalty will prevent you from performing the activities necessary to achieve compliance*).

EXPLANATION:

STATE OF NORTH CAROLINA

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES

COUNTY OF RUTHERFORD

IN THE MATTER OF ASSESSMENT
OF CIVIL PENALTIES AGAINST

Town of Lake Lure
Lake Lure WWTP

PERMIT NO. NC0025381

)
)
)
)
)
)
)

WAIVER OF RIGHT TO AN
ADMINISTRATIVE HEARING AND
STIPULATION OF FACTS

CASE NO. LV-2014-0119

Having been assessed civil penalties totaling \$1,897.50 for violation(s) as set forth in the assessment document of the Division of Water Resources dated September 23, 2014, the undersigned, desiring to seek remission of the civil penalty, does hereby waive the right to an administrative hearing in the above-stated matter and does stipulate that the facts are as alleged in the assessment document. The undersigned further understands that all evidence presented in support of remission of this civil penalty must be submitted to the Director of the Division of Water Resources within thirty (30) days of receipt of the notice of assessment. No new evidence in support of a remission request will be allowed after (30) days from the receipt of the notice of assessment.

This the _____ day of _____, 20____

SIGNATURE

ADDRESS

TELEPHONE

ATTACHMENT A

Town of Lake Lure

CASE NUMBER: LV-2014-0119

PERMIT: NC0025381 FACILITY: Lake Lure WWTP COUNTY: Rutherford REGION: Asheville

Limit Violations

PENALTY	MONITORING REPORT	OUTFALL / PPI	LOCATION	PARAMETER	VIOLATION DATE	FREQUENCY	UNIT OF MEASURE	LIMIT VALUE	CALCULATED VALUE	% OVER LIMIT	VIOLATION TYPE
\$750.00	4-2014	001	Effluent	NH3-N - Conc	4/30/14	3 X week	mg/l	4.30	11.20	159.6	Monthly Average Exceeded
\$250.00	4-2014	001	Effluent	TSS - Conc	4/26/14	3 X week	mg/l	45	76.30	69.6	Weekly Average Exceeded
\$750.00	4-2014	001	Effluent	TSS - Conc	4/30/14	3 X week	mg/l	30	41.80	39.3	Monthly Average Exceeded

DIVISION OF WATER RESOURCES - CIVIL PENALTY ASSESSMENT (FILE)

Violator: Lake Lure WWTP / NC0025381

County: Rutherford

Case Number: LV-2014-0119

8 ASSESSMENT FACTORS

As required by G.S. 143-214.6A(c), in determining the amount of the penalty I considered the factors set out in G.S. 143B-282.1(b), which are:

- 1) **The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;**
All effluent violations may be detrimental to the receiving stream but may not be immediately quantified.
- 2) **The duration and gravity of the violation;**
One Monthly Average Ammonia Nitrogen exceeded the permit limit by 159.6 %.
One Weekly Average TSS exceeded the permit limit by 69.6%.
One Monthly Average TSS exceeded the permit limit by 39.2%.
- 3) **The effect on ground or surface water quantity or quality or on air quality;**
All effluent violations may be detrimental to the receiving stream but may not be immediately quantified.
- 4) **The cost of rectifying the damage;**
The cost is unknown.
- 5) **The amount of money saved by noncompliance;**
The amount of money saved would include the cost of excess solids removal and additional chemicals and aeration. It would also include more operating and maintenance time on site.
- 6) **Whether the violation was committed willfully or intentionally;**
It does not appear to be either.
- 7) **The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and**
There has been one civil penalty enforcement in the twelve months prior to this violation.
- 8) **The cost to the State of the enforcement procedures.**

\$147.50.

9/23/2014
Date



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office, NCDENR

(Fill Copy)

1
NC DENR Raleigh Regional Office

NPDES PERMIT NO. NC0025381 DISCHARGE NO. 001 MONTH April YEAR 2014
FACILITY NAME Town of Lake Lure CLASS PC II COUNTY Rutherford
OPERATOR IN RESPONSIBLE CHARGE (ORC) Donald G. Byers GRADE IV 10939
CERTIFIED LABORATORIES(1) Environmental Testing Solutions # NC600 & Byers Environmental # 5641

CHECK BOX IF ORC HAS CHANGED

PERSONS COLLECTING SAMPLES

Sheridan Byers / Don Byers

Mail ORIGINAL and ONE COPY to:

ATTN: CENTRAL FILES

DIV. OF ENVIRONMENTAL MANAGEMENT

DEHNR

1617 Mail Service Center

RALEIGH, NC 27699-1617

X [Signature] 5/29/2014
(SIGNATURE OF OPERATOR IN RESPONSIBLE CHARGE) DATE

BY THIS SIGNATURE, I CERTIFY THAT THE REPORT IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

RECEIVED
JUN 23 2014

DATE	Operator Arrival Time: 2400 Clock	Operator Time On Site	ORC On Site?	50050	00010	00400	50060	00310	00530	00610	31616	TGP3B	00300	01042	1032	01042	00720	
				FLOW	TEMPERATURE CELSIUS	pH	CHLORINE RESIDUAL	BODs 20 C	TOTAL SUSPENDED RESIDUE	AMMONIA NITROGEN	FECAL COLIFORM (GEOMETRIC MEAN)	ACUTE TOXIC	D.O.	Copper	Zinc	Aluminum	Iron	
HRS	HRS	Y/N	MGD	°C	UNITS	UG/L	MG/L	MG/L	MG/L	col /100ML	PTF	MG/L	MG/L	MG/L	mg/l	mg/l	mg/l	
1	0900	4.0	y	0.22489	10	6.0	< 28	8.5	28.0	10.0	4	Pass						
2	0915	4.0	b	0.23610	10	6.2	30	7.4	27.0	10.0	< 2							
3	0930	4.0	y	0.23507														
4	0930	2.0	b	0.25100														
5	1100	1.0	n	0.26030														
6	1130	1.0	n	0.24160														
7	0730	3.0	b	0.26620	10	6.1	30	10.0	49.0	12.0	< 2					3.00	17.00	
8	0800	2.5	b	0.34810	10	6.2	< 28	9.4	35.0	8.6	< 2							
9	0800	2.5	b	0.24340	10	6.2	< 28	7.5	30.0	8.7	< 2							
10	0815	1.5	b	0.25780														
11	1330	1.0	n	0.30060														
12	1100	1.0	n	0.22960														
13	1100	1.0	n	0.25470														
14	0800	2.5	b	0.24880	12	6.3	< 28	13.0	36.0	12.0	< 2					1.80	15.00	
15	0800	2.0	b	0.27780	11	6.3	< 28	9.9	36.0	12.0	< 2							
16	0730	3.3	b	0.25420	11	6.2	< 28	8.0	25.0	12.0	< 2							
17	0830	1.5	b	0.20130														
18	0900	1.0	b	0.21950														
19	0900	2.0	y	0.24430														
20	0900	2.0	y	0.31570														
21	0900	2.0	y	0.24260	13	6.5	< 28	12.0	49.0	13.0	10							
22	0900	2.0	y	0.31700	12	6.0	< 28	9.5	60.0	12.0	155					2.60	20.00	
23	0845	2.5	b	0.28590	12	6.2	< 28	12.0	120.0	12.0	< 2							
24	0900	3.0	y	0.24060														
25	0915	3.0	y	0.25510														
26	1430	1.0	n	0.36420														
27	0530	1.0	n	0.29840														
28	0800	2.5	b	0.19210	12	6.1	35	16.0	36.0	11.0	< 2					3.20	28.00	
29	0915	4.0	y	0.21840	13	6.3	< 28	9.5	36.0	11.0	13							
30	0900	1.5	b	0.28150	12	6.1	32	8.6	18.0	12.0	< 2							
31	0800	2.0	y	0.24400														
AVERAGE				0.25970	11.3		29.1	10.1	41.8	11.2	< 4	Pass				2.65	20	
MAXIMUM				0.36420	13.0	6.5	35	16.0	120	13.0	155					3.20	28	
MINIMUM				0.19210	10	6	28	7.4	18	8.6	< 2					1.80	15	
%REMOVAL																		
Comp. (C) Grab (G)				cont.	G	G	G	G	G	G	G	G	G	G	G	G	G	G
Monthly Limit				0.995		6-9	50	30	30		200							

RECEIVED
JUN 03 2014
CENTRAL FILE
DWQ/BOG

QA

MES

DEM Form MR-1 (12/93)

JUN 19 2014

JUN 18 2014

JAC

JAC

8/6/14 NOV-2014-LV-0382 / 9/23/14

LV-2014-0119

5 FACILITY STATUS

Facility Status: (Please check one of the following)

All monitoring data and sampling frequencies meet permit requirements

Compliant

All monitoring data and sampling frequencies do NOT meet permit requirements

Noncompliant

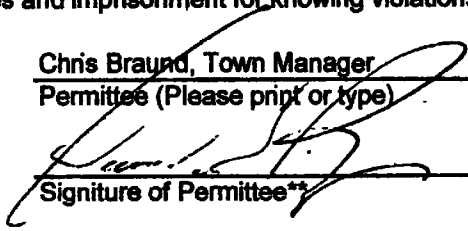
If the facility is noncompliant, please comment on corrective actions being taken in respect to equipment, operation, maintenance, etc., and a time table for improvements to be made.

The facility monthly average concentration of TSS was 41.8. The Town is in the planning and design phase for increased sludge handling facilities to improve solids handling in the plant and reduce effluent TSS concentrations

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

Chris Braund, Town Manager

Permittee (Please print or type)



Signature of Permittee**

23-May-14

Date

PO Box 255, Lake Lure, NC 28746

828.625.9983

August 2013

Permittee Address

Phone Number

Permit Exp. Date

PARAMETER CODES

(File Copy)

9/23/2014
1

Permit Enforcement History Details by Owner

Owner : Town of Lake Lure
Facility : Lake Lure WWTP
Permit : NC0025381
Region : Asheville County : Rutherford

Case Number	MR	Penalty Assessment Approved	Penalty Amount	Enforcement Costs	Damages	Remission Request Received	Enf Conf Held	Enf Remission Amount	EMC Hearing Held	EMC Remission Amount	OAH Remission Amount	Collection MemoSent To AGO	Total Paid	Balance Due	Has Plan	Print Case Closed
RV-1993-0044		8/11/93	\$250.00	\$0.00	\$0.00									\$0.00	No	7/1/93
DV-1997-0011		4/23/98	\$5,000.00	\$394.24	\$394.24	5/21/98	8/5/98	\$2000					\$3,394.24	\$0.00	No	10/7/98
CV-1999-0010		1/11/00	\$4,000.00	\$179.10	\$179.10								\$4,179.10	\$0.00	No	2/17/00
LV-2000-0332		8/8/00	\$1,250.00	\$105.50	\$105.50								\$1,355.50	\$0.00	No	8/25/00
LV-2000-0397		9/18/00	\$500.00	\$105.50	\$105.50								\$805.50	\$0.00	No	10/11/00
LV-2001-0240		7/9/01	\$1,000.00	\$105.50	\$105.50								\$1,105.50	\$0.00	No	10/8/01
LV-2002-0434		9/17/02	\$1,250.00	\$105.50	\$105.50								\$1,355.50	\$0.00	No	10/8/02
LV-2002-0438		9/17/02	\$250.00	\$105.50	\$105.50								\$355.50	\$0.00	No	10/8/02
LV-2002-0681		12/15/02	\$250.00	\$105.50	\$105.50								\$355.50	\$0.00	No	12/30/02
LV-2003-0812	6-2003	9/15/03	\$250.00	\$100.00	\$100.00								\$350.00	\$0.00	No	10/13/03
LV-2003-0778	9-2003	12/15/03	\$250.00	\$100.00	\$100.00								\$350.00	\$0.00	No	1/5/04
LV-2004-0204	10-2003	8/14/04	\$500.00	\$100.00	\$100.00								\$800.00	\$0.00	No	6/29/04
LV-2004-0323	5-2004	8/3/04	\$250.00	\$100.00	\$100.00								\$350.00	\$0.00	No	8/23/04
LV-2004-0437	6-2004	9/1/04	\$250.00	\$100.00	\$100.00								\$350.00	\$0.00	No	9/22/04
LV-2006-0335	2-2006	9/5/06	\$250.00	\$128.82	\$128.82								\$378.82	\$0.00	No	9/15/06
LV-2007-0032	7-2006	2/8/07	\$1,750.00	\$128.82	\$128.82								\$1,878.82	\$0.00	No	12/11/07

Case No.	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount	Date	Amount
LV-2007-0033	8-2006	2/8/07	\$2,000.00	2/8/07	\$126.82	8-2006	2/8/07	\$2,126.82	No	\$0.00	12/11/07	\$2,126.82
LV-2007-0034	9-2006	2/8/07	\$2,000.00	2/8/07	\$126.82	9-2006	2/8/07	\$2,126.82	No	\$0.00	12/11/07	\$2,126.82
LV-2007-0035	10-2006	2/9/07	\$1,500.00	2/9/07	\$126.82	10-2006	2/9/07	\$1,626.82	No	\$0.00	12/11/07	\$1,626.82
LV-2007-0036	11-2006	2/9/07	\$2,500.00	2/9/07	\$126.82	11-2006	2/9/07	\$1,876.82	No	\$0.00	12/11/07	\$1,876.82
SP-2008-0023	4-2008	12/2/08	\$3,500.00		\$0.00	4-2008	12/2/08	\$3,500.00	No	\$0.00	12/5/08	\$3,500.00
SP-2008-0023	7-2008	12/2/08	\$3,500.00		\$0.00	7-2008	12/2/08	\$3,500.00	No	\$0.00	12/5/08	\$3,500.00
SP-2009-0001	8-2008	1/5/09	\$2,000.00			8-2008	1/5/09	\$2,000.00	No	\$0.00	1/7/09	\$2,000.00
LV-2010-0303	4-2010	9/8/10	\$750.00	10/8/10	\$67.00	8/3/11	\$0	\$817.00	No	\$0.00	9/14/11	\$817.00
LV-2010-0353	5-2010	10/25/10	\$1,000.00	11/24/10	\$87.00			\$1,067.00	No	\$1,067.00		\$1,067.00
LV-2010-0394	6-2010	11/30/10	\$1,000.00	1/3/11	\$67.00			\$1,067.00	No	\$1,067.00		\$1,067.00
LV-2011-0015	7-2010	1/13/11	\$2,250.00	2/12/11	\$67.00			\$2,317.00	No	\$2,317.00		\$2,317.00
LV-2011-0047	8-2010	2/22/11	\$2,250.00	3/21/11	\$67.00			\$2,317.00	No	\$2,317.00		\$2,317.00
LV-2011-0048	9-2010	2/22/11	\$1,562.50	3/21/11	\$67.00			\$1,629.50	No	\$1,629.50		\$1,629.50
LV-2011-0049	10-2010	2/22/11	\$1,250.00	3/21/11	\$67.00			\$1,317.00	No	\$1,317.00		\$1,317.00
LV-2011-0302	4-2011	11/21/11	\$1,125.00	12/21/11	\$142.00			\$1,267.00	No	\$1,267.00		\$1,267.00
LV-2014-0116	1-2014	9/18/14	\$1,000.00		\$147.50			\$1,147.50	No	\$1,147.50		\$1,147.50

Total Cases: 31 Total Penalty Amount: \$46,438 Total Enforcement Cost: \$3225.76 Sum Of Total Paid: \$34,334.26 Total Balance Due: \$12,129.00

Sum of Total Case Penalties: \$49,663.26 Total Penalties After Remissions: \$46,463.28



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

Certified Mail # 7012 1010 0002 1965 7796

Return Receipt Requested

October 07, 2014

RECEIVED/DENR/DWR

OCT 13 2014

Water Quality
Permitting Section

Chris Braund, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

SUBJECT: Notice of Violation and Assessment of Civil Penalty
for Violations of North Carolina General Statute (G.S.) 143-215.1(a)(6)
and NPDES Permit No. NC0025381
Town of Lake Lure
Lake Lure WWTP
Case No. LV-2014-0126
Rutherford County

Dear Permittee:

This letter transmits a Notice of Violation and assessment of civil penalty in the amount of \$1,897.50 (\$1,750.00 civil penalty + \$147.50 enforcement costs) against Town of Lake Lure.

This assessment is based upon the following facts: a review has been conducted of the discharge monitoring report (DMR) submitted by Town of Lake Lure for the month of May 2014. This review has shown the subject facility to be in violation of the discharge limitations and/or monitoring requirements found in NPDES Permit No. NC0025381. The violations, which occurred in May 2014, are summarized in Attachment A to this letter.

Based upon the above facts, I conclude as a matter of law that Town of Lake Lure violated the terms, conditions or requirements of NPDES Permit No. NC0025381 and G.S. 143-215.1(a)(6) in the manner and extent shown in Attachment A. In accordance with the maximums established by G.S. 143-215.6A(a)(2), a civil penalty may be assessed against any person who violates the terms, conditions or requirements of a permit required by G.S. 143-215.1(a).

Based upon the above findings of fact and conclusions of law, and in accordance with authority provided by the Secretary of the Department of Environment and Natural Resources and the Director of the Division of Water Resources, I, G. Landon Davidson, Regional Supervisor, Asheville Regional Office hereby make the following civil penalty assessment against Town of Lake Lure:

2090 U.S. 70 Highway, Swannanoa, NC 28778

Phone: 828-296-4500 \ Internet: www.ncdenr.gov <<http://www.ncdenr.gov>>

An Equal Opportunity \ Affirmative Action Employer - Made in part by recycled paper

<u>\$750.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>NH3-N - Conc.</u>
<u>\$750.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>TSS - Conc.</u>
<u>\$0.00</u>	<u>0</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Weekly Average for <u>NH3-N - Conc.</u>
<u>\$250.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Weekly Average for <u>TSS - Conc.</u>
<u>\$1,750.00</u>	TOTAL CIVIL PENALTY
<u>\$147.50</u>	Enforcement Costs
<u>\$1,897.50</u>	TOTAL AMOUNT DUE

Pursuant to G.S. 143-215.6A(c), in determining the amount of the penalty I have taken into account the Findings of Fact and Conclusions of Law and the factors set forth at G.S. 143B-282.1(b), which are:

- (1) The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;
- (2) The duration and gravity of the violation;
- (3) The effect on ground or surface water quantity or quality or on air quality;
- (4) The cost of rectifying the damage;
- (5) The amount of money saved by noncompliance;
- (6) Whether the violation was committed willfully or intentionally;
- (7) The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and
- (8) The cost to the State of the enforcement procedures.

Within **thirty (30) days** of receipt of this notice, you must do **one** of the following:

- (1) Submit payment of the penalty, **OR**
- (2) Submit a written request for remission, **OR**
- (3) Submit a written request for an administrative hearing

Option 1: Submit payment of the penalty:

Payment should be made directly to the order of the Department of Environment and Natural Resources (*do not include waiver form*). Payment of the penalty will not foreclose further enforcement action for any continuing or new violation(s). Please submit payment to the attention of:

NPDES Compliance/Enforcement Unit
Division of Water Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Option 2: Submit a written request for remission or mitigation including a detailed justification for such request:

Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Because a remission request forecloses the option of an administrative hearing, such a request must be accompanied by a waiver of your right to an administrative hearing and a stipulation and agreement that no factual or legal issues are in dispute. Please prepare a detailed statement that establishes why you believe the civil penalty should be remitted, and submit it to the Division of Water Resources at the address listed below. In determining whether a remission request will be approved, the following factors shall be considered:

- (1) whether one or more of the civil penalty assessment factors in NCGS 143B-282.1(b) was wrongfully applied to the detriment of the petitioner;
- (2) whether the violator promptly abated continuing environmental damage resulting from the violation;
- (3) whether the violation was inadvertent or a result of an accident;
- (4) whether the violator had been assessed civil penalties for any previous violations; or
- (5) whether payment of the civil penalty will prevent payment for the remaining necessary remedial actions.

Please note that all evidence presented in support of your request for remission must be submitted in writing. The Director of the Division of the Division of Water Resources will review your evidence and inform you of his decision in the matter of your remission request. The response will provide details regarding the case status, directions for payment, and provision for further appeal of the penalty to the Environmental Management Commission's Committee on Civil Penalty Remissions (Committee). Please be advised that the Committee cannot consider information that was not part of the original remission request considered by the Director. Therefore, it is very important that you prepare a complete and thorough statement in support of your request for remission.

In order to request remission, you must complete and submit the enclosed "Request for Remission of Civil Penalties, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form within thirty (30) days of receipt of this notice. The Division of Water Resources also requests that you complete and submit the enclosed "Justification for Remission Request."

Both forms should be submitted to the following address:

NPDES Compliance/Enforcement Unit
Division of Water Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Option 3: File a petition for an administrative hearing with the Office of Administrative Hearings:

If you wish to contest any statement in the attached assessment document you must file a petition for an administrative hearing. You may obtain the petition form from the Office of Administrative Hearings. You must file the petition with the Office of Administrative Hearings within thirty (30) days of receipt of this notice. A petition is considered filed when it is received in the Office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m., except for official state holidays. The petition may be filed by facsimile (fax) or electronic mail by an attached file (with restrictions) - provided the signed original, one (1) copy and a filing fee (if a filing fee is required by NCGS §150B-23.2) is received in the Office of Administrative Hearings within seven (7) business days following the faxed or electronic transmission. You should contact the Office of Administrative Hearings with all questions regarding the filing fee and/or the details of the filing process.

The mailing address and telephone and fax numbers for the Office of Administrative Hearings are as follows:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Tel: (919) 733-2698
Fax: (919) 733-3478

One (1) copy of the petition must also be served on DENR as follows:

Mr. John Evans, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center
Raleigh, North Carolina 27699-1601

Please indicate the case number (as found on page one of this letter) on the petition.

Failure to exercise one of the options above within thirty (30) days of receipt of this letter, as evidenced by an internal

date/time received stamp (not a postmark), will result in this matter being referred to the Attorney General's Office for collection of the penalty through a civil action. Please be advised that additional penalties may be assessed for violations that occur after the review period of this assessment.

If you have any questions, please contact Janet Cantwell with the Division of Water Resources staff of the Asheville Regional Office at (828) 296-4667 or via email at janet.cantwell@ncdenr.gov.

Sincerely,



for Thomas A. Reeder, Director
Division of Water Resources, NCDENR

By G. Landon Davidson, Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDENR

ATTACHMENTS

Cc:	WQS Asheville Regional Office - Enforcement File	(w/attachments)
	NPDES Compliance/Enforcement Unit - Enforcement File	(w/attachments)
	Central Files, Water Quality Section	(w/attachments)

JUSTIFICATION FOR REMISSION REQUEST

Case Number: LV-2014-0126

County: Rutherford

Assessed Party: Town of Lake Lure

Permit No.: NC0025381

Amount Assessed: \$1,897.50

Please use this form when requesting remission of this civil penalty. You must also complete the "Request For Remission, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form to request remission of this civil penalty. You should attach any documents that you believe support your request and are necessary for the Director to consider in evaluating your request for remission. Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Pursuant to N.C.G.S. § 143B-282.1(c), remission of a civil penalty may be granted only when one or more of the following five factors apply. Please check each factor that you believe applies to your case and provide a detailed explanation, including copies of supporting documents, as to why the factor applies (attach additional pages as needed).

- (a) one or more of the civil penalty assessment factors in N.C.G.S. 143B-282.1(b) were wrongfully applied to the detriment of the petitioner (*the assessment factors are listed in the civil penalty assessment document*);
- (b) the violator promptly abated continuing environmental damage resulting from the violation (*i.e., explain the steps that you took to correct the violation and prevent future occurrences*);
- (c) the violation was inadvertent or a result of an accident (*i.e., explain why the violation was unavoidable or something you could not prevent or prepare for*);
- (d) the violator had not been assessed civil penalties for any previous violations;
- (e) payment of the civil penalty will prevent payment for the remaining necessary remedial actions (*i.e., explain how payment of the civil penalty will prevent you from performing the activities necessary to achieve compliance*).

EXPLANATION:

STATE OF NORTH CAROLINA

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES

COUNTY OF RUTHERFORD

IN THE MATTER OF ASSESSMENT
OF CIVIL PENALTIES AGAINST

Town of Lake Lure
Lake Lure WWTP

PERMIT NO. NC0025381

)
)
)
)
)
)
)

**WAIVER OF RIGHT TO AN
ADMINISTRATIVE HEARING AND
STIPULATION OF FACTS**

CASE NO. LV-2014-0126

Having been assessed civil penalties totaling \$1,897.50 for violation(s) as set forth in the assessment document of the Division of Water Resources dated October 07, 2014, the undersigned, desiring to seek remission of the civil penalty, does hereby waive the right to an administrative hearing in the above-stated matter and does stipulate that the facts are as alleged in the assessment document. The undersigned further understands that all evidence presented in support of remission of this civil penalty must be submitted to the Director of the Division of Water Resources within thirty (30) days of receipt of the notice of assessment. No new evidence in support of a remission request will be allowed after (30) days from the receipt of the notice of assessment.

This the _____ day of _____, 20_____

SIGNATURE

ADDRESS

TELEPHONE

ATTACHMENT A

Town of Lake Lure

CASE NUMBER: LV-2014-0126

PERMIT: NC0025381 FACILITY: Lake Lure WWTP COUNTY: Rutherford REGION: Asheville

Limit Violations

PENALTY	MONITORING REPORT	OUTFALL / PPI	LOCATION	PARAMETER	VIOLATION DATE	FREQUENCY	UNIT OF MEASURE	LIMIT	CALCULATED VALUE	% OVER LIMIT	VIOLATION TYPE
\$0.00	5-2014	001	Effluent	NH3-N - Conc	5/10/14	3 X week	mg/l	12.90	15.30	18.9	Weekly Average Exceeded
\$750.00	5-2014	001	Effluent	NH3-N - Conc	5/31/14	3 X week	mg/l	4.30	12.70	195.3	Monthly Average Exceeded
\$250.00	5-2014	001	Effluent	TSS - Conc	5/17/14	3 X week	mg/l	45	56.30	25.2	Weekly Average Exceeded
\$750.00	5-2014	001	Effluent	TSS - Conc	5/31/14	3 X week	mg/l	30	40.50	35.0	Monthly Average Exceeded

DIVISION OF WATER RESOURCES - CIVIL PENALTY ASSESSMENT (FILE)

Violator: Lake Lure WWTP / NC0025381

County: Rutherford

Case Number: LV-2014-0126

8 ASSESSMENT FACTORS

As required by G.S. 143-214.6A(c), in determining the amount of the penalty I considered the factors set out in G.S. 143B-282.1(b), which are:

- 1) **The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;**
All effluent violations may be detrimental to the receiving stream but may not be immediately quantified.
- 2) **The duration and gravity of the violation;**
One Monthly Average Ammonia Nitrogen exceeded the permit limit by 195 %.
One Weekly Average Ammonia Nitrogen exceeded the permit limit by 18%.
One Monthly Average TSS exceeded the permit limit by 35%.
One Weekly Average TSS exceeded the permit limit by 25%.
- 3) **The effect on ground or surface water quantity or quality or on air quality;**
All effluent violations may be detrimental to the receiving stream but may not be immediately quantified.
- 4) **The cost of rectifying the damage;**
The cost is unknown.
- 5) **The amount of money saved by noncompliance;**
The amount of money saved would include the cost of excess solids removal and additional chemicals and aeration. It would also include more operating and maintenance time on site.
- 6) **Whether the violation was committed willfully or intentionally;**
It does not appear to be either.
- 7) **The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and**
There have been two civil penalty enforcements in the twelve months prior to this violation.
- 8) **The cost to the State of the enforcement procedures.**

\$147.50.

10-8-14
Date



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office, NCDENR

EFFLUENT

NPDES PERMIT NO. NC0025381 DISCHARGE NO 001 MONTH May YEAR 2014
 FACILITY NAME Town of Lake Lure CLASS PC II COUNTY Rutherford
 OPERATOR IN RESPONSIBLE CHARGE (ORC) Donald G. Byers GRADE IV 10939
 CERTIFIED LABORATORIES (1) Environmental Testing Solutions # NC600 & Byers Environmental # 5641

(File Copy)
1

CHECK BOX IF ORC HAS CHANGED PERSONS COLLECTING SAMPLES Sheridan Byers / Don Byers

Mail ORIGINAL and ONE COPY to:
 ATTN: CENTRAL FILES
 DIV. OF ENVIRONMENTAL MANAGEMENT
 DEHNR

1617 Mail Service Center
 RALEIGH, NC 27699-1617

X Donald G. Byers 6/25/2014
 (SIGNATURE OF OPERATOR IN RESPONSIBLE CHARGE) DATE

ELC
JUL 8 2014

BY THIS SIGNATURE, I CERTIFY THAT THE REPORT IS
 ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DATE	Operator Arrival Time: 2400 Clock	Operator Time On Site	ORC On Site?	50050	00010	00400	50060	00310	00530	00610	31616	TGP3B	00300	01042	1032	01042	00720	
				FLOW	TEMPERATURE CELSIUS	pH	CHLORINE RESIDUAL	BODs 20 C	TOTAL SUSPENDED RESIDUE	AMMONIA NITROGEN	FECAL COLIFORM (GEOMETRIC MEAN)	ACUTE TOXIC	D.O.	Copper	Zinc	Aluminum	Iron	
				DAILY RATE	°C	UNITS	UG/L	MG/L	MG/L	MG/L	col /100ML	PPM	MG/L	MG/L	MG/L	mg/l	mg/l	
1	0930	1.0	N	0.22489														
2	0830	2.0	B	0.23610														
3	1230	1.0	N	0.23507														
4	1030	1.0	N	0.25100														
5	0830	2.0	B	0.26030	12	6.5	36	7.3	34.0	17.0	2					1.30	24	
6	915	4.0	Y	0.24160	15	6.3	< 28	8.5	44.0	16.0	< 1							
7	915	4.0	Y	0.26620	14	6.0	< 28	12.0	18.0	13.0	1							
8	0900	3.0	Y	0.34810														
9	0900	5.0	B	0.24340														
10	1130	1.0	N	0.25780														
11	1045	1.0	N	0.30060														
12	0830	2.5	B	0.22960														
13	0630	4.0	Y	0.25470	12	6.2	< 28	7.5	58.0	13.0	5					5.90	49	
14	0800	4.0	Y	0.24880	12	6.2	< 28	6.2	87.0	14.0	2							
15	0915	4.0	Y	0.27780	13	6.2	< 28	6.2	26.0	9.4	76							
16	0930	2.0	B	0.25420														
17	0845	1.0	N	0.20130														
18	1400	1.0	N	0.21950														
19	0800	2.5	B	0.24430	12	6.3	31	13.0	53.0	14.0	< 2					5.60	15	
20	0915	3.0	Y	0.31570	12	6.1	30	4.8	49.0	11.0	< 1							
21	0800	3.0	B	0.24260	12	6.2	< 28	4.5	33.0	11.0	< 1							
22	0900	3.0	Y	0.31700														
23	0900	3.0	Y	0.28590														
24	1300	2.0	N	0.24060														
25	0900	3.0	Y	0.25510														
26	0830	2.0	N	0.36420														
27	0900	3.0	Y	0.29840	16	7.0	< 28	10.0	26.0	17.0	< 2					1.80	10	
28	0930	3.0	Y	0.19210	10	6.1	47	5.0	25.0	7.8	1							
29	0900	3.0	Y	0.21840	11	6.1	42	3.5	35.0	9.2	2							
30	0910	3.0	Y	0.28150														
31	0900	1.0	N	0.24400														
AVERAGE				0.25970	12.6		< 31.8	7.4	40.5	12.7	< 2						3.90	25
MAXIMUM				0.36420	16.0	7.0	47	13.0	87	17.0	76						6.90	49
MINIMUM				0.19210	10	6	< 28	3.5	18	7.8	< 1						1.30	10
%REMOVAL																		
Comp. (C) Grab (G)				cont.	G	G	G	C	C	C	G	G	G	C	C	C	C	C
Monthly Limit				0.995		6-9	50	30	30		200							

DEM Form MR-1 (12/93)

9/23/14 NOV-2014-LV-0422 / 9/23/14 NOV-2014-LV-0126

QA
 JUL 15 2014

5 FACILITY STATUS

Facility Status: (Please check one of the following)

All monitoring data and sampling frequencies meet permit requirements

Compliant

All monitoring data and sampling frequencies do NOT meet permit requirements

Noncompliant

If the facility is noncompliant, please comment on corrective actions being taken in respect to equipment, operation, maintenance, etc., and a time table for improvements to be made.

The facility monthly average concentration of TSS was 40.5 and the NH3 average was 12.7.

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

Chris Braund, Town Manager

Permittee (Please print or type)



Signature of Permittee**

25-Jun-14

Date

PO Box 255, Lake Lure, NC 28746

828.625.9983

August 2013

Permittee Address

Phone Number

Permit Exp. Date

PARAMETER CODES

(File Copy)
10/7/2014
1

Permit Enforcement History Details by Owner

Owner : Town of Lake Lure
 Facility : Lake Lure WWTP
 Permit : NC0025381
 Region : Asheville
 County : Rutherford

Case Number	MR	Penalty Assessment Approved	Penalty Amount	Enforcement Costs	Damages	Remission Request Received	Enf Conf Held	Enf Remission Amount	EMC Hearing Held	EMC Remission Amount	OAH Remission Amount	Collection MemoSent To AGO	Total Paid	Balance Due	Has Pmt Plan	Case Closed
RV-1993-0044		6/11/93	\$250.00	\$0.00	\$0.00								\$0.00	\$0.00	No	7/1/93
DV-1997-0011		4/23/98	\$5,000.00	\$394.24		5/21/98	8/5/98	\$2000					\$3,394.24	\$0.00	No	10/7/98
CV-1998-0010		1/11/00	\$4,000.00	\$179.10									\$4,179.10	\$0.00	No	2/17/00
LV-2000-0332		8/8/00	\$1,250.00	\$105.50									\$1,355.50	\$0.00	No	8/25/00
LV-2000-0397		9/18/00	\$500.00	\$105.50									\$605.50	\$0.00	No	10/11/00
LV-2001-0240		7/9/01	\$1,000.00	\$105.50									\$1,105.50	\$0.00	No	10/8/01
LV-2002-0434		9/17/02	\$1,250.00	\$105.50									\$1,355.50	\$0.00	No	10/8/02
LV-2002-0438		9/17/02	\$250.00	\$105.50									\$355.50	\$0.00	No	10/8/02
LV-2002-0881		12/15/02	\$250.00	\$105.50									\$355.50	\$0.00	No	12/30/02
LV-2003-0812	6-2003	9/15/03	\$250.00	\$100.00									\$350.00	\$0.00	No	10/13/03
LV-2003-0778	9-2003	12/15/03	\$250.00	\$100.00									\$350.00	\$0.00	No	1/5/04
LV-2004-0204	10-2003	6/14/04	\$500.00	\$100.00									\$800.00	\$0.00	No	8/29/04
LV-2004-0323	5-2004	8/3/04	\$250.00	\$100.00									\$350.00	\$0.00	No	8/23/04
LV-2004-0437	6-2004	9/1/04	\$250.00	\$100.00									\$350.00	\$0.00	No	9/22/04
LV-2006-0335	2-2006	9/5/06	\$250.00	\$126.82									\$376.82	\$0.00	No	9/15/06
LV-2007-0032	7-2006	2/6/07	\$1,750.00	\$126.82									\$1,876.82	\$0.00	No	12/11/07

LV-2007-0033	8-2006	2/8/07	\$2,000.00	\$126.82					\$2,128.82	\$0.00	No	12/11/07
LV-2007-0034	9-2006	2/8/07	\$2,000.00	\$128.82					\$2,128.82	\$0.00	No	12/11/07
LV-2007-0035	10-2008	2/9/07	\$1,500.00	\$126.82					\$1,828.82	\$0.00	No	12/11/07
LV-2007-0038	11-2006	2/9/07	\$2,500.00	\$126.82					\$1,678.82	\$0.00	No	12/11/07
SP-2008-0023	4-2008	12/2/08	\$3,500.00	\$0.00					\$3,500.00	\$0.00	No	12/5/08
SP-2008-0023	7-2008	12/2/08	\$3,500.00	\$0.00					\$3,500.00	\$0.00	No	12/5/08
SP-2009-0001	8-2008	1/5/09	\$2,000.00						\$2,000.00	\$0.00	No	1/7/09
LV-2010-0303	4-2010	9/8/10	\$750.00	\$87.00	10/8/10	8/3/11	\$0		\$817.00	\$0.00	No	9/14/11
LV-2010-0353	5-2010	10/25/10	\$1,000.00	\$87.00	11/24/10				\$1,067.00	\$1,067.00	No	
LV-2010-0394	6-2010	11/30/10	\$1,000.00	\$87.00	1/3/11				\$1,087.00	\$1,087.00	No	
LV-2011-0015	7-2010	1/13/11	\$2,250.00	\$87.00	2/12/11				\$2,317.00	\$2,317.00	No	
LV-2011-0047	8-2010	2/22/11	\$2,250.00	\$87.00	3/21/11				\$2,317.00	\$2,317.00	No	
LV-2011-0048	9-2010	2/22/11	\$1,562.50	\$87.00	3/21/11				\$1,629.50	\$1,629.50	No	
LV-2011-0049	10-2010	2/22/11	\$1,250.00	\$87.00	3/21/11				\$1,317.00	\$1,317.00	No	
LV-2011-0302	4-2011	11/21/11	\$1,125.00	\$142.00	12/21/11				\$1,267.00	\$1,267.00	No	
LV-2014-0116	1-2014	9/23/14	\$1,000.00	\$147.50					\$1,147.50	\$1,147.50	No	
LV-2014-0119	4-2014	9/23/14	\$1,750.00	\$147.50					\$1,897.50	\$1,897.50	No	

Total Cases: 32 Total Penalty Amount: \$48,188 Total Enforcement Cost: \$3373.26 Sum Of Total Paid: \$34,334.26 Total Balance Due: \$14,026.50

Sum of Total Case Penalties: \$51,560.78 Total Penalties After Remissions: \$48,380.78



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

Certified Mail # 7012 1010 0002 1965 7802

Return Receipt Requested

October 16, 2014

Chris Braund, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/DENR/DWR

OCT 30 2014

Water Quality
Permitting Section

SUBJECT: Notice of Violation and Assessment of Civil Penalty
for Violations of North Carolina General Statute (G.S.) 143-215.1(a)(6)
and NPDES Permit No. NC0025381
Town of Lake Lure
Lake Lure WWTP
Case No. LV-2014-0127
Rutherford County

Dear Permittee:

This letter transmits a Notice of Violation and assessment of civil penalty in the amount of \$2,147.50 (\$2,000.00 civil penalty + \$147.50 enforcement costs) against Town of Lake Lure.

This assessment is based upon the following facts: a review has been conducted of the discharge monitoring report (DMR) submitted by Town of Lake Lure for the month of June 2014. This review has shown the subject facility to be in violation of the discharge limitations and/or monitoring requirements found in NPDES Permit No. NC0025381. The violations, which occurred in June 2014, are summarized in Attachment A to this letter.

Based upon the above facts, I conclude as a matter of law that Town of Lake Lure violated the terms, conditions or requirements of NPDES Permit No. NC0025381 and G.S. 143-215.1(a)(6) in the manner and extent shown in Attachment A. In accordance with the maximums established by G.S. 143-215.6A(a)(2), a civil penalty may be assessed against any person who violates the terms, conditions or requirements of a permit required by G.S. 143-215.1(a).

Based upon the above findings of fact and conclusions of law, and in accordance with authority provided by the Secretary of the Department of Environment and Natural Resources and the Director of the Division of Water Resources, I, G. Landon Davidson, Regional Supervisor, Asheville Regional Office hereby make the following civil penalty assessment against Town of Lake Lure:

2090 U.S. 70 Highway, Swannanoa, NC 28778

Phone: 828-296-4500 \ Internet: www.ncdenr.gov <<http://www.ncdenr.gov>>

An Equal Opportunity \ Affirmative Action Employer - Made in part by recycled paper

<u>\$750.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>NH3-N - Conc.</u>
<u>\$750.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>TSS - Conc.</u>
<u>\$250.00</u>	<u>1</u> of the <u>2</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Weekly Average for <u>NH3-N - Conc.</u>
<u>\$250.00</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Weekly Average for <u>TSS - Conc.</u>
<u>\$2,000.00</u>	TOTAL CIVIL PENALTY
<u>\$147.50</u>	Enforcement Costs
<u>\$2,147.50</u>	TOTAL AMOUNT DUE

Pursuant to G.S. 143-215.6A(c), in determining the amount of the penalty I have taken into account the Findings of Fact and Conclusions of Law and the factors set forth at G.S. 143B-282.1(b), which are:

- (1) The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;
- (2) The duration and gravity of the violation;
- (3) The effect on ground or surface water quantity or quality or on air quality;
- (4) The cost of rectifying the damage;
- (5) The amount of money saved by noncompliance;
- (6) Whether the violation was committed willfully or intentionally;
- (7) The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and
- (8) The cost to the State of the enforcement procedures.

Within **thirty (30) days** of receipt of this notice, you must do **one** of the following:

- (1) Submit payment of the penalty, **OR**
- (2) Submit a written request for remission, **OR**
- (3) Submit a written request for an administrative hearing

Option 1: Submit payment of the penalty:

Payment should be made directly to the order of the Department of Environment and Natural Resources (*do not include waiver form*). Payment of the penalty will not foreclose further enforcement action for any continuing or new violation(s). Please submit payment to the attention of:

NPDES Compliance/Enforcement Unit
Division of Water Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Option 2: Submit a written request for remission or mitigation including a detailed justification for such request:

Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Because a remission request forecloses the option of an administrative hearing, such a request must be accompanied by a waiver of your right to an administrative hearing and a stipulation and agreement that no factual or legal issues are in dispute. Please prepare a detailed statement that establishes why you believe the civil penalty should be remitted, and submit it to the Division of Water Resources at the address listed below. In determining whether a remission request will be approved, the following factors shall be considered:

- (1) whether one or more of the civil penalty assessment factors in NCGS 143B-282.1(b) was wrongfully applied to the detriment of the petitioner;
- (2) whether the violator promptly abated continuing environmental damage resulting from the violation;
- (3) whether the violation was inadvertent or a result of an accident;
- (4) whether the violator had been assessed civil penalties for any previous violations; or
- (5) whether payment of the civil penalty will prevent payment for the remaining necessary remedial actions.

Please note that all evidence presented in support of your request for remission must be submitted in writing. The Director of the Division of the Division of Water Resources will review your evidence and inform you of his decision in the matter of your remission request. The response will provide details regarding the case status, directions for payment, and provision for further appeal of the penalty to the Environmental Management Commission's Committee on Civil Penalty Remissions (Committee). Please be advised that the Committee cannot consider information that was not part of the original remission request considered by the Director. Therefore, it is very important that you prepare a complete and thorough statement in support of your request for remission.

In order to request remission, you must complete and submit the enclosed "Request for Remission of Civil Penalties, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form within thirty (30) days of receipt of this notice. The Division of Water Resources also requests that you complete and submit the enclosed "Justification for Remission Request."

Both forms should be submitted to the following address:

NPDES Compliance/Enforcement Unit
Division of Water Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Option 3: File a petition for an administrative hearing with the Office of Administrative Hearings:

If you wish to contest any statement in the attached assessment document you must file a petition for an administrative hearing. You may obtain the petition form from the Office of Administrative Hearings. You must file the petition with the Office of Administrative Hearings within thirty (30) days of receipt of this notice. A petition is considered filed when it is received in the Office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m., except for official state holidays. The petition may be filed by facsimile (fax) or electronic mail by an attached file (with restrictions) - provided the signed original, one (1) copy and a filing fee (if a filing fee is required by NCGS §150B-23.2) is received in the Office of Administrative Hearings within seven (7) business days following the faxed or electronic transmission. You should contact the Office of Administrative Hearings with all questions regarding the filing fee and/or the details of the filing process.

The mailing address and telephone and fax numbers for the Office of Administrative Hearings are as follows:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Tel: (919) 733-2698
Fax: (919) 733-3478

One (1) copy of the petition must also be served on DENR as follows:

Mr. John Evans, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center
Raleigh, North Carolina 27699-1601

Please indicate the case number (as found on page one of this letter) on the petition.

Failure to exercise one of the options above within thirty (30) days of receipt of this letter, as evidenced by an internal

date/time received stamp (not a postmark), will result in this matter being referred to the Attorney General's Office for collection of the penalty through a civil action. Please be advised that additional penalties may be assessed for violations that occur after the review period of this assessment.

If you have any questions, please contact Janet Cantwell with the Division of Water Resources staff of the Asheville Regional Office at (828) 296-4667 or via email at janet.cantwell@ncdenr.gov.

Sincerely,



for Thomas A. Reeder, Director
Division of Water Resources, NCDENR

By G. Landon Davidson, Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDENR

ATTACHMENTS

Cc:	WQS Asheville Regional Office - Enforcement File	(w/attachments)
	NPDES Compliance/Enforcement Unit - Enforcement File	(w/attachments)
	Central Files, Water Quality Section	(w/attachments)

JUSTIFICATION FOR REMISSION REQUEST

Case Number: LV-2014-0127

County: Rutherford

Assessed Party: Town of Lake Lure

Permit No.: NC0025381

Amount Assessed: \$2,147.50

Please use this form when requesting remission of this civil penalty. You must also complete the "Request For Remission, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form to request remission of this civil penalty. You should attach any documents that you believe support your request and are necessary for the Director to consider in evaluating your request for remission. Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Pursuant to N.C.G.S. § 143B-282.1(c), remission of a civil penalty may be granted only when one or more of the following five factors apply. Please check each factor that you believe applies to your case and provide a detailed explanation, including copies of supporting documents, as to why the factor applies (attach additional pages as needed).

- (a) one or more of the civil penalty assessment factors in N.C.G.S. 143B-282.1(b) were wrongfully applied to the detriment of the petitioner (*the assessment factors are listed in the civil penalty assessment document*);
- (b) the violator promptly abated continuing environmental damage resulting from the violation (*i.e., explain the steps that you took to correct the violation and prevent future occurrences*);
- (c) the violation was inadvertent or a result of an accident (*i.e., explain why the violation was unavoidable or something you could not prevent or prepare for*);
- (d) the violator had not been assessed civil penalties for any previous violations;
- (e) payment of the civil penalty will prevent payment for the remaining necessary remedial actions (*i.e., explain how payment of the civil penalty will prevent you from performing the activities necessary to achieve compliance*).

EXPLANATION:

STATE OF NORTH CAROLINA

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES

COUNTY OF RUTHERFORD

IN THE MATTER OF ASSESSMENT
OF CIVIL PENALTIES AGAINST

Town of Lake Lure
Lake Lure WWTP

PERMIT NO. NC0025381

)
)
)
)
)
)
)

**WAIVER OF RIGHT TO AN
ADMINISTRATIVE HEARING AND
STIPULATION OF FACTS**

CASE NO. LV-2014-0127

Having been assessed civil penalties totaling \$2,147.50 for violation(s) as set forth in the assessment document of the Division of Water Resources dated October 16, 2014, the undersigned, desiring to seek remission of the civil penalty, does hereby waive the right to an administrative hearing in the above-stated matter and does stipulate that the facts are as alleged in the assessment document. The undersigned further understands that all evidence presented in support of remission of this civil penalty must be submitted to the Director of the Division of Water Resources within thirty (30) days of receipt of the notice of assessment. No new evidence in support of a remission request will be allowed after (30) days from the receipt of the notice of assessment.

This the _____ day of _____, 20____

SIGNATURE

ADDRESS

TELEPHONE

ATTACHMENT A

Town of Lake Lure

CASE NUMBER: LV-2014-0127

PERMIT: NC0025381 FACILITY: Lake Lure WWTP COUNTY: Rutherford REGION: Asheville

Limit Violations

PENALTY	MONITORING REPORT	OUTFALL / PPI	LOCATION	PARAMETER	VIOLATION DATE	FREQUENCY	UNIT OF MEASURE	CALCULATED VALUE	% OVER LIMIT	VIOLATION TYPE
\$250.00	6-2014	001	Effluent	NH3-N - Conc	6/21/14	3 X week	mg/l	17.70	37.0	Weekly Average Exceeded
\$0.00	6-2014	001	Effluent	NH3-N - Conc	6/28/14	3 X week	mg/l	15.30	18.9	Weekly Average Exceeded
\$750.00	6-2014	001	Effluent	NH3-N - Conc	6/30/14	3 X week	mg/l	14.20	229.2	Monthly Average Exceeded
\$250.00	6-2014	001	Effluent	TSS - Conc	6/7/14	3 X week	mg/l	80	77.8	Weekly Average Exceeded
\$750.00	6-2014	001	Effluent	TSS - Conc	6/30/14	3 X week	mg/l	45.90	52.8	Monthly Average Exceeded



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

Certified Mail # 7012 1010 0002 1965 7819

Return Receipt Requested

October 16, 2014

Chris Braund, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/DENR/DWR

OCT 30 2014

Water Quality
Permitting Section

SUBJECT: Notice of Violation and Assessment of Civil Penalty
for Violations of North Carolina General Statute (G.S.) 143-215.1(a)(6)
and NPDES Permit No. NC0025381
Town of Lake Lure
Lake Lure WWTP
Case No. LV-2014-0128
Rutherford County

Dear Permittee:

This letter transmits a Notice of Violation and assessment of civil penalty in the amount of \$1,710.00 (\$1,562.50 civil penalty + \$147.50 enforcement costs) against Town of Lake Lure.

This assessment is based upon the following facts: a review has been conducted of the discharge monitoring report (DMR) submitted by Town of Lake Lure for the month of July 2014. This review has shown the subject facility to be in violation of the discharge limitations and/or monitoring requirements found in NPDES Permit No. NC0025381. The violations, which occurred in July 2014, are summarized in Attachment A to this letter.

Based upon the above facts, I conclude as a matter of law that Town of Lake Lure violated the terms, conditions or requirements of NPDES Permit No. NC0025381 and G.S. 143-215.1(a)(6) in the manner and extent shown in Attachment A. In accordance with the maximums established by G.S. 143-215.6A(a)(2), a civil penalty may be assessed against any person who violates the terms, conditions or requirements of a permit required by G.S. 143-215.1(a).

Based upon the above findings of fact and conclusions of law, and in accordance with authority provided by the Secretary of the Department of Environment and Natural Resources and the Director of the Division of Water Resources, I, G. Landon Davidson, Regional Supervisor, Asheville Regional Office hereby make the following civil penalty assessment against Town of Lake Lure:

2090 U.S. 70 Highway, Swannanoa, NC 28778

Phone: 828-296-4500 \ Internet: www.ncdenr.gov <<http://www.ncdenr.gov>>

An Equal Opportunity \ Affirmative Action Employer - Made in part by recycled paper

<u>\$937.50</u>	<u>1</u> of the <u>1</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Monthly Average for <u>NH3-N - Conc.</u>
<u>\$625.00</u>	<u>2</u> of the <u>3</u> violations of 143-215.1(a)(6) and NPDES Permit No.NC0025381, by discharging waste water into the waters of the State in violation of the Permit Weekly Average for <u>NH3-N - Conc.</u>
<u>\$1,562.50</u>	TOTAL CIVIL PENALTY
<u>\$147.50</u>	Enforcement Costs
<u>\$1,710.00</u>	TOTAL AMOUNT DUE

Pursuant to G.S. 143-215.6A(c), in determining the amount of the penalty I have taken into account the Findings of Fact and Conclusions of Law and the factors set forth at G.S. 143B-282.1(b), which are:

- (1) The degree and extent of harm to the natural resources of the State, to the public health, or to private property resulting from the violation;
- (2) The duration and gravity of the violation;
- (3) The effect on ground or surface water quantity or quality or on air quality;
- (4) The cost of rectifying the damage;
- (5) The amount of money saved by noncompliance;
- (6) Whether the violation was committed willfully or intentionally;
- (7) The prior record of the violator in complying or failing to comply with programs over which the Environmental Management Commission has regulatory authority; and
- (8) The cost to the State of the enforcement procedures.

Within **thirty (30) days** of receipt of this notice, you must do **one** of the following:

- (1) Submit payment of the penalty, **OR**
- (2) Submit a written request for remission, **OR**
- (3) Submit a written request for an administrative hearing

Option 1: Submit payment of the penalty:

Payment should be made directly to the order of the Department of Environment and Natural Resources (*do not include waiver form*). Payment of the penalty will not foreclose further enforcement action for any continuing or new violation(s). Please submit payment to the attention of:

NPDES Compliance/Enforcement Unit
 Division of Water Resources
 1617 Mail Service Center
 Raleigh, North Carolina 27699-1617

Option 2: Submit a written request for remission or mitigation including a detailed justification for such request:

Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Because a remission request forecloses the option of an administrative hearing, such a request must be accompanied by a waiver of your right to an administrative hearing and a stipulation and agreement that no factual or legal issues are in dispute. Please prepare a detailed statement that establishes why you believe the civil penalty should be remitted, and submit it to the Division of Water Resources at the address listed below. In determining whether a remission request will be approved, the following factors shall be considered:

- (1) whether one or more of the civil penalty assessment factors in NCGS 143B-282.1(b) was wrongfully applied to the detriment of the petitioner;
- (2) whether the violator promptly abated continuing environmental damage resulting from the violation;
- (3) whether the violation was inadvertent or a result of an accident;
- (4) whether the violator had been assessed civil penalties for any previous violations; or
- (5) whether payment of the civil penalty will prevent payment for the remaining necessary remedial actions.

Please note that all evidence presented in support of your request for remission must be submitted in writing. The Director of the Division of the Division of Water Resources will review your evidence and inform you of his decision in the matter of your remission request. The response will provide details regarding the case status, directions for payment, and provision for further appeal of the penalty to the Environmental Management Commission's Committee on Civil Penalty Remissions (Committee). Please be advised that the Committee cannot consider information that was not part of the original remission request considered by the Director. Therefore, it is very important that you prepare a complete and thorough statement in support of your request for remission.

In order to request remission, you must complete and submit the enclosed "Request for Remission of Civil Penalties, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form within thirty (30) days of receipt of this notice. The Division of Water Resources also requests that you complete and submit the enclosed "Justification for Remission Request."

Both forms should be submitted to the following address:

NPDES Compliance/Enforcement Unit
Division of Water Resources
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Option 3: File a petition for an administrative hearing with the Office of Administrative Hearings:

If you wish to contest any statement in the attached assessment document you must file a petition for an administrative hearing. You may obtain the petition form from the Office of Administrative Hearings. You must file the petition with the Office of Administrative Hearings within thirty (30) days of receipt of this notice. A petition is considered filed when it is received in the Office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00 a.m. and 5:00 p.m., except for official state holidays. The petition may be filed by facsimile (fax) or electronic mail by an attached file (with restrictions) - provided the signed original, one (1) copy and a filing fee (if a filing fee is required by NCGS §150B-23.2) is received in the Office of Administrative Hearings within seven (7) business days following the faxed or electronic transmission. You should contact the Office of Administrative Hearings with all questions regarding the filing fee and/or the details of the filing process.

The mailing address and telephone and fax numbers for the Office of Administrative Hearings are as follows:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Tel: (919) 733-2698
Fax: (919) 733-3478

One (1) copy of the petition must also be served on DENR as follows:

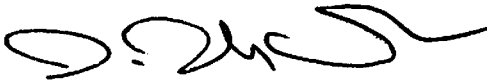
Mr. John Evans, General Counsel
Department of Environment and Natural Resources
1601 Mail Service Center
Raleigh, North Carolina 27699-1601

Please indicate the case number (as found on page one of this letter) on the petition.

Failure to exercise one of the options above within thirty (30) days of receipt of this letter, as evidenced by an internal date/time received stamp (not a postmark), will result in this matter being referred to the Attorney General's Office for collection of the penalty through a civil action. Please be advised that additional penalties may be assessed for violations that occur after the review period of this assessment.

If you have any questions, please contact Janet Cantwell with the Division of Water Resources staff of the Asheville Regional Office at (828) 296-4667 or via email at janet.cantwell@ncdenr.gov.

Sincerely,



for Thomas A. Reeder, Director
Division of Water Resources, NCDENR

By G. Landon Davidson, Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDENR

ATTACHMENTS

Cc:	WQS Asheville Regional Office - Enforcement File	(w/attachments)
	NPDES Compliance/Enforcement Unit - Enforcement File	(w/attachments)
	Central Files, Water Quality Section	(w/attachments)

JUSTIFICATION FOR REMISSION REQUEST

Case Number: LV-2014-0128

County: Rutherford

Assessed Party: Town of Lake Lure

Permit No.: NC0025381

Amount Assessed: \$1,710.00

Please use this form when requesting remission of this civil penalty. You must also complete the "Request For Remission, Waiver of Right to an Administrative Hearing, and Stipulation of Facts" form to request remission of this civil penalty. You should attach any documents that you believe support your request and are necessary for the Director to consider in evaluating your request for remission. Please be aware that a request for remission is limited to consideration of the five factors listed below as they may relate to the reasonableness of the amount of the civil penalty assessed. Requesting remission is not the proper procedure for contesting whether the violation(s) occurred or the accuracy of any of the factual statements contained in the civil penalty assessment document. Pursuant to N.C.G.S. § 143B-282.1(c), remission of a civil penalty may be granted only when one or more of the following five factors apply. Please check each factor that you believe applies to your case and provide a detailed explanation, including copies of supporting documents, as to why the factor applies (attach additional pages as needed).

- (a) one or more of the civil penalty assessment factors in N.C.G.S. 143B-282.1(b) were wrongfully applied to the detriment of the petitioner (*the assessment factors are listed in the civil penalty assessment document*);
- (b) the violator promptly abated continuing environmental damage resulting from the violation (*i.e., explain the steps that you took to correct the violation and prevent future occurrences*);
- (c) the violation was inadvertent or a result of an accident (*i.e., explain why the violation was unavoidable or something you could not prevent or prepare for*);
- (d) the violator had not been assessed civil penalties for any previous violations;
- (e) payment of the civil penalty will prevent payment for the remaining necessary remedial actions (*i.e., explain how payment of the civil penalty will prevent you from performing the activities necessary to achieve compliance*).

EXPLANATION:

STATE OF NORTH CAROLINA

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES

COUNTY OF RUTHERFORD

IN THE MATTER OF ASSESSMENT
OF CIVIL PENALTIES AGAINST

Town of Lake Lure
Lake Lure WWTP

PERMIT NO. NC0025381

)
)
)
)
)
)
)

**WAIVER OF RIGHT TO AN
ADMINISTRATIVE HEARING AND
STIPULATION OF FACTS**

CASE NO. LV-2014-0128

Having been assessed civil penalties totaling \$1,710.00 for violation(s) as set forth in the assessment document of the Division of Water Resources dated October 16, 2014, the undersigned, desiring to seek remission of the civil penalty, does hereby waive the right to an administrative hearing in the above-stated matter and does stipulate that the facts are as alleged in the assessment document. The undersigned further understands that all evidence presented in support of remission of this civil penalty must be submitted to the Director of the Division of Water Resources within thirty (30) days of receipt of the notice of assessment. No new evidence in support of a remission request will be allowed after (30) days from the receipt of the notice of assessment.

This the _____ day of _____, 20____

SIGNATURE

ADDRESS

TELEPHONE

ATTACHMENT A

Town of Lake Lure

CASE NUMBER: LV-2014-0128

PERMIT: NC0025381 FACILITY: Lake Lure WWTP COUNTY: Rutherford REGION: Asheville

Limit Violations

PENALTY	MONITORING REPORT	OUTFALL/ PPI	LOCATION	PARAMETER	VIOLATION DATE	FREQUENCY	UNIT OF MEASURE	LIMIT	CALCULATED VALUE	% OVER LIMIT	VIOLATION TYPE
\$0.00	7-2014	001	Effluent	NH3-N - Conc	7/12/14	3 X week	mg/l	12.90	15	16.3	Weekly Average Exceeded
\$312.50	7-2014	001	Effluent	NH3-N - Conc	7/19/14	3 X week	mg/l	12.90	17.70	37.0	Weekly Average Exceeded
\$312.50	7-2014	001	Effluent	NH3-N - Conc	7/26/14	3 X week	mg/l	12.90	16.70	29.2	Weekly Average Exceeded
\$937.50	7-2014	001	Effluent	NH3-N - Conc	7/31/14	3 X week	mg/l	4.30	17.10	298.7	Monthly Average Exceeded



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 2, 2015

RECEIVED/DENR/DWR

FEB 05 2015

Water Quality
Permitting Section

CERTIFIED MAIL
RETURN RECEIPT REQUESTED 7014 0510 0000 4466 0059

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

Subject: **Notice of Violation and
Recommendation for Enforcement**
Tracking #: NOV-2015-LV-0043
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County

Dear Mr. Braund:

A review of the **September 2014** self-monitoring report for the subject facility revealed violations of the following parameter:

Date	Outfall	Parameter	Reported Value	Permit Limit
09/30/2014	001	Ammonia Nitrogen	11.91 mg/ l	4.3 mg/ l
09/06/2014	001	Ammonia Nitrogen	14.33 mg/ l	12.9 mg/ l
09/27/2014	001	Ammonia Nitrogen	13.67 mg/ l	12.9 mg/ l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the August 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
February 2, 2015
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

September 24, 2014

CERTIFIED MAIL
RETURN RECEIPT REQUESTED 7012 1010 0002 1965 7765

RECEIVED/DENR/DWR

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

SEP 26 2014

Water Quality
Permitting Section

Subject: **Notice of Violation and
Recommendation for Enforcement**
Tracking #: NOV-2014-LV-0422
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County

Dear Mr. Braund:

A review of the **May 2014** self-monitoring report for the subject facility revealed violations of the following parameters:

Date	Outfall	Parameter	Reported Value	Permit Limit
05/31/2014	001	Ammonia Nitrogen	12.7 mg/l	4.3 mg/l
05/10/2014	001	Ammonia Nitrogen	15.3 mg/l	12.9 mg/l
05/31/2014	001	TSS	40.5 mg/l	30 mg/l
05/17/2014	001	TSS	56.3 mg/l	45 mg/l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the May 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
September 24, 2014
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E Skvarla, III
Secretary

September 24, 2014

CERTIFIED MAIL
RETURN RECEIPT REQUESTED 7012 1010 0002 1965 7772

RECEIVED/DENR/DWR

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

SEP 26 2014

Water Quality
Permitting Section

Subject: **Notice of Violation and
Recommendation for Enforcement**
Tracking #: NOV-2014-LV-0423
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County

Dear Mr. Braund:

A review of the **June 2014** self-monitoring report for the subject facility revealed violations of the following parameters:

Date	Outfall	Parameter	Reported Value	Permit Limit
06/30/2014	001	Ammonia Nitrogen	14.1 mg/l	4.3 mg/l
06/21/2014	001	Ammonia Nitrogen	17.6 mg/l	12.9 mg/l
06/28/2014	001	Ammonia Nitrogen	15.3 mg/l	12.9 mg/l
06/30/2014	001	TSS	45.8 mg/l	30 mg/l
06/07/2014	001	TSS	80 mg/l	45 mg/l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the June 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
September 24, 2014
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

September 24, 2014

CERTIFIED MAIL
RETURN RECEIPT REQUESTED 7012 1010 0002 1965 7789

RECEIVED/DENR/DWR

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

SEP 26 2014

Water Quality
Permitting Section

Subject: **Notice of Violation and
Recommendation for Enforcement**
Tracking #: NOV-2014-LV-0424
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County

Dear Mr. Braund:

A review of the **July 2014** self-monitoring report for the subject facility revealed violations of the following parameter:

Date	Outfall	Parameter	Reported Value	Permit Limit
07/31/2014	001	Ammonia Nitrogen	17.1 mg/ l	4.3 mg/ l
07/12/2014	001	Ammonia Nitrogen	15 mg/ l	12.9 mg/ l
07/19/2014	001	Ammonia Nitrogen	17.6 mg/ l	12.9 mg/ l
07/26/2014	001	Ammonia Nitrogen	16.6 mg/ l	12.9 mg/ l


A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the July 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
September 24, 2014
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 2, 2015

RECEIVED/DENR/DWR

FEB 05 2015

Water Quality
Permitting Sector

CERTIFIED MAIL
RETURN RECEIPT REQUESTED 7012 1010 0002 1966 0000

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

Subject: **Notice of Violation and
Recommendation for Enforcement
Tracking #: NOV-2015-LV-0042
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County**

Dear Mr. Braund:

A review of the **August 2014** self-monitoring report for the subject facility revealed violations of the following parameter:

Date	Outfall	Parameter	Reported Value	Permit Limit
08/31/2014	001	Ammonia Nitrogen	13.18 mg/l	4.3 mg/l
08/02/2014	001	Ammonia Nitrogen	22 mg/l	12.9 mg/l
08/09/2014	001	Ammonia Nitrogen	16 mg/l	12.9 mg/l
0816/2014	001	Ammonia Nitrogen	13 mg/l	12.9 mg/l
08/23/2014	001	Ammonia Nitrogen	13 mg/l	12.9 mg/l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the August 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 2, 2015

RECEIVED/DENR/DWR

FEB 05 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED 7012 1010 0002 1966 0000

Water Quality
Permitting Section

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

Subject: **Notice of Violation and
Recommendation for Enforcement
Tracking #: NOV-2015-LV-0042
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County**

Dear Mr. Braund:

A review of the **August 2014** self-monitoring report for the subject facility revealed violations of the following parameter:

Date	Outfall	Parameter	Reported Value	Permit Limit
08/31/2014	001	Ammonia Nitrogen	13.18 mg/l	4.3 mg/l
08/02/2014	001	Ammonia Nitrogen	22 mg/l	12.9 mg/l
08/09/2014	001	Ammonia Nitrogen	16 mg/l	12.9 mg/l
0816/2014	001	Ammonia Nitrogen	13 mg/l	12.9 mg/l
08/23/2014	001	Ammonia Nitrogen	13 mg/l	12.9 mg/l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the August 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
February 2, 2015
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 2, 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED **7012 1010 0002 1966 0000**

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

March 3, 2015 – 2nd Mail Attempt
CERTIFIED MAIL
RETURN RECEIPT REQUESTED
7010 1870 0003 0874 5805

Mr. Chris Braund, Town Manager
Town of Lake Lure
Post Office Box 255
2948 Memorial Highway
Lake Lure, NC 28746

Subject: **Notice of Violation and
Recommendation for Enforcement**
Tracking #: NOV-2015-LV-0042 RECEIVED/DENR/DWR
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County

MAR 06 2015

Water Quality
Permitting Section

Dear Mr. Braund:

A review of the **August 2014** self-monitoring report for the subject facility revealed violations of the following parameter:

Date	Outfall	Parameter	Reported Value	Permit Limit
08/31/2014	001	Ammonia Nitrogen	13.18 mg/ l	4.3 mg/ l
08/02/2014	001	Ammonia Nitrogen	22 mg/ l	12.9 mg/ l
08/09/2014	001	Ammonia Nitrogen	16 mg/ l	12.9 mg/ l
0816/2014	001	Ammonia Nitrogen	13 mg/ l	12.9 mg/ l
08/23/2014	001	Ammonia Nitrogen	13 mg/ l	12.9 mg/ l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the August 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
February 2, 2015
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch ■



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 2, 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED 7014 0510 0000 4466 0059

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

March 3, 2015 – 2nd Mail Attempt
CERTIFIED MAIL
RETURN RECEIPT REQUESTED
7010 1870 0003 0874 5782

Mr. Chris Braund, Town Manager
Town of Lake Lure
Post Office Box 255
2948 Memorial Highway
Lake Lure, NC 28746

Subject: **Notice of Violation and
Recommendation for Enforcement**
Tracking #: NOV-2015-LV-0043 RECEIVED/DENR/DWR
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County

MAR 06 2015

**Water Quality
Permitting Section**

Dear Mr. Braund:

A review of the **September 2014** self-monitoring report for the subject facility revealed violations of the following parameter:

Date	Outfall	Parameter	Reported Value	Permit Limit
09/30/2014	001	Ammonia Nitrogen	11.91 mg/l	4.3 mg/l
09/06/2014	001	Ammonia Nitrogen	14.33 mg/l	12.9 mg/l
09/27/2014	001	Ammonia Nitrogen	13.67 mg/l	12.9 mg/l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the August 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
February 2, 2015
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch



Mr. Chris Braund
February 2, 2015
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDENR
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch ~~FILED~~



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 2, 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED **7014 0510 0000 4466 0066**

Mr. Chris Braund, Town Manager
Town of Lake Lure
Lake Lure WWTP
P.O. Box 255
Lake Lure, North Carolina 28746-0255

March, 3, 2015 – 2nd Mail Attempt
CERTIFIED MAIL
RETURN RECEIPT REQUESTED
7010 1870 0003 0874 5799

Mr. Chris Braund, Town Manager
Town of Lake Lure
Post Office Box 255
2948 Memorial Highway
Lake Lure, NC 28746

Subject: **Notice of Violation and
Recommendation for Enforcement** **RECEIVED/DENR/DWR**
Tracking #: NOV-2015-LV-0044
Lake Lure WWTP **MAR 06 2015**
NPDES Permit No. NC0025381 **Water Quality
Permitting Section**
Rutherford County

Dear Mr. Braund:

A review of the **October 2014** self-monitoring report for the subject facility revealed violations of the following parameter:

Date	Outfall	Parameter	Reported Value	Permit Limit
10/31/2014	001	Ammonia Nitrogen	8.98 mg/ l	4.3 mg/ l

A Notice of Violation/ Notice of Recommendation for Enforcement (NOV/ NRE) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the August 2014 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

North Carolina Department of Environmental Quality

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

October 20, 2015

RECEIVED/DENR/DWR

OCT 21 2015

CERTIFIED MAIL
RETURN RECEIPT REQUESTED **7014 0510 0000 4466 8659**

Water Quality
Permitting Section

Mr. Chris Braund, Town Manager
Town of Lake Lure
P.O. Box 255
Lake Lure, North Carolina 28746-0255

Subject: **Notice of Violation and
Notice of Intent to Enforce**
 Tracking #: NOV-2015-LV-0664
 Lake Lure WWTP
 NPDES Permit No. NC0025381
 Rutherford County

Dear Mr. Braund:

A review of the **June 2015** self-monitoring report for the subject facility revealed a violation of the following parameter:

Parameter	Date	Limit Value	Reported Value	Limit Type
Ammonia Nitrogen	06/30/2015	9.4 mg/ L	13.64 mg/ L	Monthly Average

A Notice of Violation/ Notice of Intent to Enforce (NOV/ NOI) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the June 2015 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
October 20, 2015
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDEQ
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch

North Carolina Department of Environmental Quality

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

October 22, 2015

RECEIVED/DENR/DWR

OCT 26 2015

Water Quality
Permitting Section

CERTIFIED MAIL
RETURN RECEIPT REQUESTED **7014 0510 0000 4466 8673**

Mr. Chris Braund, Town Manager
Town of Lake Lure
P.O. Box 255
Lake Lure, North Carolina 28746-0255

Subject: **Notice of Violation and
Notice of Intent to Enforce
Tracking #: NOV-2015-LV-0670
Lake Lure WWTP
NPDES Permit No. NC0025381
Rutherford County**

Dear Mr. Braund:

A review of the **July 2015** self-monitoring report for the subject facility revealed a violation of the following parameter:

Parameter	Date	Limit Value	Reported Value	Limit Type
Ammonia Nitrogen	07/31/2015	9.4 mg/ L	13.99 mg/ L	Monthly Average Exceeded

A Notice of Violation/ Notice of Intent to Enforce (NOV/ NOI) is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and NPDES Permit No. NC0025381. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1. If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) days after receipt of this Notice. A review of your response will be considered along with any information provided on the July 2015 Discharge Monitoring Report. You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Mr. Chris Braund
October 22, 2015
Page Two

Remedial actions, if not already implemented, should be taken to correct any problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent. You may contact this office for additional information.

If you have questions concerning this matter, please do not hesitate to contact Janet Cantwell or me at 828/296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations, NCDEQ
Asheville Regional Office

cc: WQ Asheville Files
MSC 1617-Central Files-Basement
WQ Enforcement/ NPDES Point Source Branch



PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7012 1010 0002 1965 6461
Return Receipt Requested

June 23, 2016

Chris Braund, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2016-LM-0041

Permit No. NC0025381

Lake Lure WWTP

Rutherford County

RECEIVED/NCDEQ/DWR

JUN 28 2016

Water Quality
Permitting Section

Dear Permittee:

A review of the March 2016 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Table with 6 columns: Sample Location, Parameter, Date, Limit Value, Reported Value, Type of Violation. Row 1: 001 Effluent, Solids, Total Suspended - Concentration (CO530), 3/31/2016, 30, 34.22, Monthly Average Exceeded

Monitoring Violation(s):

Table with 5 columns: Sample Location, Parameter, Date, Monitoring Frequency, Type of Violation. Row 1: 001 Effluent, Coliform, Fecal MF, M-FC Broth,44.5C (31616), 3/26/2016, 3 X week, Frequency Violation

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Discharge Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7015 1520 0003 5463 0028
Return Receipt Requested

September 30, 2016

Ron Nalley, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/NCDEQ/DWR

OCT 11 2016

Water Quality
Permitting Section

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: **NOV-2016-LM-0059**

Permit No. NC0025381

Lake Lure WWTP

Rutherford County

Dear Permittee:

A review of the **June 2016** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	6/30/2016	9.4	13.36	Monthly Average Exceeded.

Monitoring Violation(s):

Sample Location	Parameter	Date	Monitoring Frequency	Type of Violation
001 Effluent	Aluminum, Total (as Al) (01105)	6/4/2016	Weekly	Frequency Violation
001 Effluent	Iron, Total (as Fe) (01045)	6/4/2016	Weekly	Frequency Violation

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Discharge Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7014 0510 0000 4466 7454
Return Receipt Requested

January 11, 2016

Chris Braund, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/NCDEQ/DWR

JAN 28 2016

Water Quality
Permitting Section

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2016-LV-0028

Permit No. NC0025381

Lake Lure WWTP

Rutherford County

Dear Permittee:

A review of the August 2015 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Table with 7 columns: Sample Location, Parameter, Date, Limit Value, Reported Value, Type of Violation. Row 1: 001 Effluent, Nitrogen, Ammonia Total (as N) - Concentration (CO610), 8/31/2015, 9.4, 11.92, Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.



Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7012 1010 0002 1965 6355
Return Receipt Requested

June 22, 2016

Chris Braund, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

SUBJECT: **NOTICE OF VIOLATION**
Tracking Number: **NOV-2016-LV-0362**
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the **February 2016** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Solids, Total Suspended - Concentration (CO530)	2/29/2016	30	34.67	Monthly Average Exceeded

Remedial actions, if not already implemented, should be taken to correct any noted problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent (SOC).

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7012 1010 0002 1965 6614
Return Receipt Requested

June 29, 2016

RECEIVED/NCDEQ/DWR

JUL 12 2016

Water Quality
Permitting Section

Chris Braund, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2016-LV-0380

Permit No. NC0025381

Lake Lure WWTP

Rutherford County

Dear Permittee:

A review of the April 2016 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Table with 7 columns: Sample Location, Parameter, Date, Limit Value, Reported Value, Type of Violation. Row 1: 001 Effluent, Nitrogen, Ammonia Total (as N) - Concentration (CO610), 4/30/2016, 9.4, 11.77, Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Discharge Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

It was also noted that the Compliance Box on your eDMR was not displayed. It should have read "Non-Compliant." Please remedy this on future EDMRs.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7015 1520 0003 5463 0240
Return Receipt Requested

October 20, 2016

Ron Nalley, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY
Tracking Number: **NOV-2016-LV-0581**
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

RECEIVED/NCDEQ/DWR

OCT 28 2016

Water Quality
Permitting Section

Dear Permittee:

A review of the **July 2016** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	7/31/2016	0.495	0.561	Monthly Average Exceeded
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	7/31/2016	9.4	13.81	Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Discharge Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7012 1010 0002 1965 5044
Return Receipt Requested

April 18, 2016

Chris Braund, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

SUBJECT: **NOTICE OF VIOLATION**

Tracking Number: **NOV-2016-MV-0054**
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

RECEIVED/NCDEQ/DWR

APR 21 2016

Water Quality
Permitting Section

Dear Permittee:

A review of the **October 2015** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Monitoring Violation(s):

Sample Location	Parameter	Date	Monitoring Frequency	Type of Violation
001 Effluent	Coliform, Fecal MF, M-FC Broth, 44.5C (31616)	10/31/2015	3 X week	Frequency Violation

Since this "Discharge Monitoring Report" was processed as an **eDMR**, it is suggested that the ORC/ Certifier/ Submitter please take note of the **"VALIDATION WARNINGS"** appearing during completion of the eDMR which should alert you to any omissions of permit required parameters or limit violations for the eDMR month. *Please refer to the eDMR Facility Reporting Guide.*

Remedial actions, if not already implemented, should be taken to correct any noted problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent (SOC).

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
-Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

S. JAY ZIMMERMAN

Director

Certified Mail # 7012 1010 0002 1965 5099

Return Receipt Requested

April 21, 2016

Chris Braund, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/NCDEQ/DWR

APR 28 2016

Water Quality
Permitting Section

SUBJECT: **NOTICE OF VIOLATION**
Tracking Number: **NOV-2016-MV-0059**
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the **December 2015** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Monitoring Violation(s):

Sample Location	Parameter	Date	Monitoring Frequency	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	12/26/2015	3 X week	Frequency Violation

Remedial actions, if not already implemented, should be taken to correct any noted problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations.

Since this "Discharge Monitoring Report" was processed as an **eDMR**, it is suggested that the ORC/ Certifier/ Submitter please take note of the **"VALIDATION WARNINGS"** appearing during completion of the eDMR which should alert you to any omissions of permit required parameters or limit violations for the eDMR month. *Please refer to the eDMR Facility Reporting Guide.*

If the above parameter was left off inadvertently, please send amended DMRs within 10 business days of receipt of this letter to Raleigh and also a copy to this office.

If you have any questions concerning this matter, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

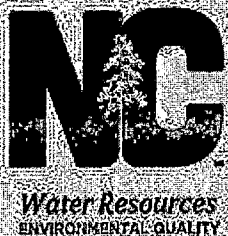
Sincerely,



For

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

S. JAY ZIMMERMAN
Director

Certified Mail # 7015 1520 0003 5463 4521
Return Receipt Requested

April 24, 2017

Ron Nalley, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/NCDEQ/DWR

APR 28 2017

Water Quality
Permitting Section

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY
Tracking Number: **NOV-2017-MV-0058, NOV-2017-LV-0265, NOV-2017-MV-0059**
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the **December 2016, January 2017 & February 2017** Discharge Monitoring Reports (DMR) for the subject facility revealed the violation(s) indicated below:

Monitoring Violation(s): (NOV-2017-MV-0058)

Sample Location	Parameter	Date	Monitoring Frequency	Type of Violation
001 Effluent	Nitrogen, Total - Concentration (CO600)	12/31/2016	Semi-annually	Frequency Violation
001 Effluent	Phosphorus, Total (as P) - Concentration (CO665)	12/31/2016	Semi-annually	Frequency Violation

Limit Exceedance Violation(s): (NOV-2017-LV-0265)

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Solids, Total Suspended - Concentration (CO530)	1/7/2017	45	60	Weekly Average Exceeded
001 Effluent	Solids, Total Suspended - Concentration (CO530)	1/31/2017	30	35	Monthly Average Exceeded

Monitoring Violation(s): (NOV-2017-MV-0059)

Sample Location	Parameter	Date	Monitoring Frequency	Type of Violation
001 Effluent	Coliform, Fecal MF, MFC Broth, 44.5 C (31616)	2/4/2017	3 X week	Frequency Violation

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Discharge Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



Water Resources
ENVIRONMENTAL QUALITY

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

S. JAY ZIMMERMAN
Director

Certified Mail # 7015 1520 0003 5463 4897
Return Receipt Requested

April 12, 2017

RECEIVED/NO/DEQ/DWR

APR 12 2017

Water Quality
Permitting Section

Ron Nalley, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

SUBJECT: NOTICE OF VIOLATION

Tracking Number: **NOV-2017-LV-0240**
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the **October 2016** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

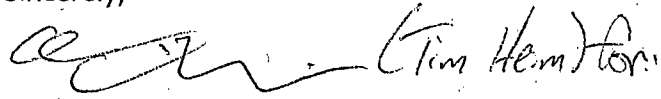
Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	10/31/2016	9.4	10.15	Monthly Average Exceeded

Remedial actions, if not already implemented, should be taken to correct any noted problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent (SOC).

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,

A handwritten signature in black ink, appearing to read "G. Landon Davidson". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File
Byers Environmental/ ORC



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

S. JAY ZIMMERMAN
Director

Certified Mail # 7016 1370 0001 6571 8461
Return Receipt Requested

June 29, 2017

Ron Nalley, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746-0255

RECEIVED/NCDEQ/DWR

JUL 11 2017

Water Quality
Permitting Section

SUBJECT: **NOTICE OF VIOLATION**
Tracking Number: **NOV-2017-LV-0460**
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the **April 2017** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	4/30/2017	0.495	0.5098	Monthly Average Exceeded

Remedial actions, if not already implemented, should be taken to correct any noted problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent (SOC).

Please review the Flows for the **April 2017** DMR and submit a written response within 10 days of receipt of this letter to this Office explaining why the Monthly Average Flow exceeded the permit limit by 2.98%.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,

A handwritten signature in black ink that reads "G. Landon Davidson" with the initials "FJR" written below it.

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Cc: WQS Asheville Regional Office - Enforcement File
NPDES Compliance/Enforcement Unit - Enforcement File



ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
S. JAY ZIMMERMAN
Director

Certified Mail # 7004 0750 0000 2589 9743
Return Receipt Requested

August 30, 2017

CENTRAL FILES

Ron Nalley, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION

Tracking Number: NOV-2017-LV-0589
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

RECEIVED/NCDEQ/DWR

SEP 07 2017

Water Quality
Permitting Section

Dear Permittee:

A review of the June 2017 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	6/30/2017	9.4	11.87	Monthly Average Exceeded

Remedial actions, if not already implemented, should be taken to correct any noted problems. The Division of Water Resources may pursue enforcement actions for this and any additional violations. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent (SOC).



NORTH CAROLINA
Environmental Quality

ROY COOPER

Governor

MICHAEL S. REGAN

Secretary

LINDA CULPEPPER

Interim Director

Certified Mail # 7017 2620 0000 9759 3905
Return Receipt Requested

November 2, 2018

Shannon Baldwin, Interim Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: **NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY**

Tracking Number: **NOV-2018-LV-0777**

NOV-2018-LV-0778

Permit No. NC0025381

Lake Lure WWTP

Rutherford County

Dear Permittee:

A review of the **August 2018** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s): NOV-2018-LV-0777

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	8/31/2018	0.495	0.6611	Monthly Average Exceeded

A review of the **September 2018** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s): NOV-2018-LV-0778

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	9/30/2018	0.495	0.6061	Monthly Average Exceeded



A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

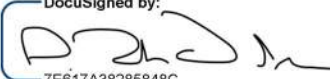
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Ec: DWQ Laserfiche



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

LINDA CULPEPPER
Interim Director

Certified Mail # 7017 2620 0000 9759 5480
Return Receipt Requested

May 17, 2018

Ron Nalley, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: **NOV-2018-MV-0089**

Permit No. NC0025381

Lake Lure WWTP

Rutherford County

Dear Permittee:

A review of the **March 2018** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Monitoring Violation(s):

Sample Location	Parameter	Date	Monitoring Frequency	Type of Violation
001 Effluent	BOD, 5-Day (20 Deg. C) - Concentration (CO310)	3/31/2018	2 X week	Frequency Violation
001 Effluent	Chlorine, Total Residual (50060)	3/31/2018	2 X week	Frequency Violation
001 Effluent	Coliform, Fecal MF, MFC Broth, 44.5 C (31616)	3/31/2018	3 X week	Frequency Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	3/31/2018	3 X week	Frequency Violation
001 Effluent	pH (00400)	3/31/2018	2 X week	Frequency Violation
001 Effluent	Solids, Total Suspended - Concentration (CO530)	3/31/2018	2 X week	Frequency Violation
001 Effluent	Temperature, Water Deg. Centigrade (00010)	3/31/2018	2 X week	Frequency Violation

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Janet Cantwell of the Asheville Regional Office at 828-296-4500.

Sincerely,



G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

Ec: DWQ Laserfiche

ROY COOPER

Governor

MICHAEL S. REGAN

Secretary

LINDA CULPEPPER

Director

NORTH CAROLINA
Environmental Quality

Certified Mail #7017 2620 0000 9759 2083
Return Receipt Requested

January 29, 2019

Shannon Baldwin, Town Manager
 Town of Lake Lure
 PO Box 255
 Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2019-LV-0043 & NOV-2019-LV-0042

Permit No. NC0025381

Lake Lure WWTP

Rutherford County

Dear Permittee:

A review of the **October 2018** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s): NOV-2019-LV-0043

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	10/31/2018	0.495	0.5716	Monthly Average Exceeded

A review of the **November 2018** Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s): NOV-2019-LV-0042

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	11/30/2018	0.495	0.543	Monthly Average Exceeded



North Carolina Department of Environmental Quality | Division of Water Resources
 Asheville Regional Office | 2090 U.S. 70 Highway | Swannanoa, North Carolina 28778
 828-296-4500

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

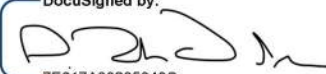
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Mikal Willmer of the Asheville Regional Office at 828-296-4500.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

EC: WQS-ARO Server
LF

G:\WR\WQ\Rutherford\Wastewater\Municipal\Lake Lure WWTP 25381\NOVs\20190129_NC0025381_NOVNOI2019LV00420043



ROY COOPER

Governor

MICHAEL S. REGAN

Secretary

LINDA CULPEPPER

Director

NORTH CAROLINA
Environmental Quality

Certified Mail #7017 2620 0000 9759 1260
Return Receipt Requested

May 14, 2019

Shannon Baldwin, Town Manager
 Town of Lake Lure
 PO Box 255
 Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2019-LV-0340
 Permit No. NC0025381
 Lake Lure WWTP
 Rutherford County

Dear Permittee:

A review of the December 2018 and the January and February 2019 Discharge Monitoring Reports (DMRs) for the subject facility revealed the violations indicated below:

Limit Exceedance Violation December 2018: NOV-2019-LV-0340

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	12/31/2018	0.495	0.5576	Monthly Average Exceeded

Limit Exceedance Violation January 2019: NOV-2019-LV-0341

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	1/31/2019	0.495	0.5416	Monthly Average Exceeded

Limit Exceedance Violation February 2019: NOV-2019-LV-0342

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	2/28/2019	0.495	0.5061	Monthly Average Exceeded



A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.

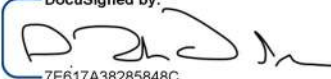
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Mikal Willmer of the Asheville Regional Office at 828-296-4500.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

EC: WQS-ARO Server
LF

G:\WR\WQ\Rutherford\Wastewater\Municipal\Lake Lure WWTP 25381\NOVs\20190514_NC0025381_NOVNOI2019DV0340_0341_0342



ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director



Certified Mail #7019 0700 0000 8867 5633
Return Receipt Requested

August 1, 2019

Shannon Baldwin, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2019-LV-0552
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the April and May 2019 Discharge Monitoring Reports (DMRs) for the subject facility revealed the violation(s) indicated below:

April Limit Exceedance Violation (NOV-2019-LV-0552):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	4/30/2019	0.495	0.5551	Monthly Average Exceeded

May Limit Exceedance Violation (NOV-2019-LV-0553):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	5/31/2019	0.495	0.6458	Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.



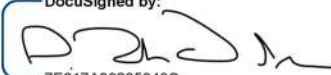
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing (electronic format is acceptable) **within ten (10) business days** after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Mikal Willmer of the Asheville Regional Office at 828-296-4500.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

EC: WQS-ARO Server
LF
Don Byers, ORC

G:\WR\WQ\Rutherford\Wastewater\Municipal\Lake Lure WWTP 25381\Violations\20190801_NC0025381_NOVNOI2019LV0552_0553



ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director



Certified Mail #7019 0700 0000 8867 5657
Return Receipt Requested

August 20, 2019

Shannon Baldwin, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY
Tracking Number: NOV-2019-LV-0619
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the June 2019 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Flow, in conduit or thru treatment plant (50050)	6/30/2019	0.495	0.6805	Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.



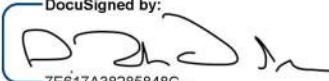
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing (email is acceptable) within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

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Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Mikal Willmer of the Asheville Regional Office at 828-296-4500.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

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ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director



Certified Mail #7019 0700 0000 8867 6357
Return Receipt Requested

September 27, 2019

Shannon Baldwin, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2019-LV-0698 & NOV-2019-LV-0699
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the July 2019 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

July 2019 Limit Violation: NOV-2019-LV-0698

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	7/31/2019	5.2	10.95	Monthly Average Exceeded

August 2019 Limit Violation: NOV-2019-LV-0699

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	8/31/2019	5.2	10.45	Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.



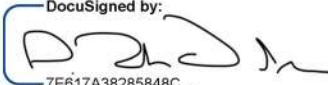
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Mikal Willmer of the Asheville Regional Office at 828-296-4500.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

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ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director



Certified Mail #7017 2620 0000 9759 2540
Return Receipt Requested

November 25, 2019

Shannon Baldwin, Town Manager
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY
Tracking Number: NOV-2019-LV-0898
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the September 2019 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	9/30/2019	5.2	9.24	Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.



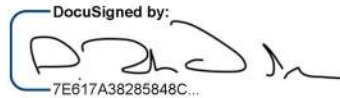
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Mikal Willmer of the Asheville Regional Office at 828-296-4686 or via email at mikal.willmer@ncdenr.gov.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

EC: WQS-ARO Server, LF

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ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director



Certified Mail #7017 2620 0000 9759 2557
Return Receipt Requested

December 2, 2019

Shannon Baldwin, Manager Town
Town of Lake Lure
PO Box 255
Lake Lure, NC 28746

SUBJECT: NOTICE OF VIOLATION & INTENT TO ASSESS CIVIL PENALTY

Tracking Number: NOV-2019-LV-0903
Permit No. NC0025381
Lake Lure WWTP
Rutherford County

Dear Permittee:

A review of the October 2019 Discharge Monitoring Report (DMR) for the subject facility revealed the violation(s) indicated below:

Limit Exceedance Violation(s):

Sample Location	Parameter	Date	Limit Value	Reported Value	Type of Violation
001 Effluent	Nitrogen, Ammonia Total (as N) - Concentration (CO610)	10/31/2019	5.2	9.6	Monthly Average Exceeded

A Notice of Violation/Intent to Issue Civil Penalty is being issued for the noted violation of North Carolina General Statute (G.S.) 143-215.1 and the facility's NPDES WW Permit. Pursuant to G.S. 143-215.6A, a civil penalty of not more than twenty-five thousand dollars (\$25,000.00) may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of any permit issued pursuant to G.S. 143-215.1.



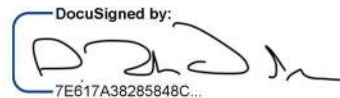
If you wish to provide additional information regarding the noted violation, request technical assistance, or discuss overall compliance please respond in writing within ten (10) business days after receipt of this Notice. A review of your response will be considered along with any information provided on the submitted Monitoring Report(s). You will then be notified of any civil penalties that may be assessed regarding the violations. **If no response is received in this Office within the 10-day period, a civil penalty assessment may be prepared.**

Remedial actions should have already been taken to correct this problem and prevent further occurrences in the future. The Division of Water Resources may pursue enforcement action for this and any additional violations of State law. If the violations are of a continuing nature, not related to operation and/or maintenance problems, and you anticipate remedial construction activities, then you may wish to consider applying for a Special Order by Consent.

Reminder: Pursuant to Permit Condition 6 in Section E, the Permittee is required to verbally notify the Regional Office as soon as possible, not to exceed 24 hours, from first knowledge of any non-compliance at the facility including limit violations, bypasses of, or failure of a treatment unit. A written report may be required within 5 days if directed by Division staff. Prior notice should be given for anticipated or potential problems due to planned maintenance activities, taking units off-line, etc.

If you have any questions concerning this matter or to apply for an SOC, please contact Mikal Willmer of the Asheville Regional Office at 828-296-4686 or via email at mikal.willmer@ncdenr.gov.

Sincerely,

DocuSigned by:

7E617A38285848C...

G. Landon Davidson, P.G., Regional Supervisor
Water Quality Regional Operations Section
Asheville Regional Office
Division of Water Resources, NCDEQ

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June 19, 2020

Division of Water Resources
NPDES Compliance & Expedited Permit Unit
1617 Mail Service Center
Raleigh, NC 27699-1317

SUBJECT: Lake Lure Special Order by Consent (SOC)

To whom it may concern:

The Town of Lake Lure, NC would like to enter an SOC with NC DEQ – DWR in regard to the effluents limits of the Lake Lure WWTP and collection system, NPDES Permit # NC0025381 and WQCS00131 respectively. This SOC would be a first step toward the goal of long-term NPDES compliance. Enclosed is one original and two copies of the SOC application. Please advise if you have any questions or need additional information.

Sincerely,

Maurice J. Walsh, P.E.
LaBella Associates, P.C.
Program Manager

**STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES**

APPLICATION FOR A SPECIAL ORDER BY CONSENT (SOC)

I. PERMIT RELATED INFORMATION:

1. Applicant (corporation, individual, or other): Town of Lake Lure
2. Print or Type Owner's or Signing Official's Name and Title:
Shannon Baldwin, Town Manager
3. Facility Name (as shown on Permit): Lake Lure Wastewater Treatment Plant
4. Owner Phone: (828) 625-9983 (or) _____
5. Owner Email: townmgr@townoflakelure.com
4. Application Date: June 19, 2020
5. NPDES Permit No. (if applicable): NC0025381
6. Name of the specific wastewater treatment facility (*if different from I.3. above*):

II. PRE-APPLICATION MEETING:

Prior to submitting this completed application form, applicants must meet with the appropriate regional office staff to discuss whether or not an SOC is appropriate for this situation. Please note the date this meeting occurred and who represented the permittee:

Representative: Shannon Baldwin, Town Manager Date: 2/12/2020.

III. ADDITIONAL FLOW OR FLOW REALLOCATION:

In accordance with NCGS 143-215.67(b), only facilities owned by a unit of government may request additional flow.

Additional flow may be allowed under an SOC only in specific circumstances. These circumstances may include eliminating discharges that are not compliant with an NPDES or Non-discharge permit. These circumstances do not include failure to perform proper maintenance of treatment systems, collection systems or disposal systems. When requesting additional flow, the facility must include its justification and supporting documentation.

If the requested additional flow is **non-domestic**, the facility must be able to demonstrate the ability to effectively treat the waste and dispose of residuals. The applicant must provide a detailed analysis of the constituents in the proposed non-domestic wastewater.

The total domestic additional flow requested: _____ 0 _____ gallons per day.

The total non-domestic additional flow requested: _____ 0 _____ gallons per day.

The total additional flow (*sum of the above*): _____ 0 _____ gallons per day.

Please attach a detailed description or project listing of the proposed allocation for additional flow, with an explanation of how flow quantities were estimated. Further, any additional flow requested must be justified by a complete analysis, by the permittee, that additional flow will not adversely impact wastewater collection/treatment facilities or surface waters.

IV. NECESSITY NARRATIVE:

Please attach a narrative providing a detailed explanation of the circumstances regarding the necessity of the proposed SOC. Include the following issues:

- Existing and/or unavoidable future violations(s) of permit conditions or limits(s),
- The existing treatment process and any process modifications that have been made to date to ensure optimum performance of existing facilities,
- Collection system rehabilitation work completed or scheduled (including dates),
- Coordination with industrial users regarding their discharges or pretreatment facilities. Identify any non-compliant significant industrial users and measure(s) proposed or already taken to bring the pretreatment facilities back into compliance. If any industrial facilities are currently under consent agreements, please attach these agreements,
- Date and outcome of last Industrial Waste Survey,
- Whether or not the facility is acting as a regional facility receiving wastewater from other municipalities having independent pretreatment programs.

V. CERTIFICATION:

The applicant must submit a report prepared by an independent professional with expertise in wastewater treatment. This report must address the following:

- An evaluation of existing treatment units, operational procedures and recommendations as to how the efficiencies of these facilities can be maximized. The person in charge of such evaluation must sign this document.
- A certification that these facilities could not be operated in a manner that would achieve compliance with final permit limits. The person making such determination must sign this certification.
- The effluent limits that the facility could be expected to meet if operated at their maximum efficiency during the term of the requested SOC (be sure to consider interim construction phases).
- Any other actions taken to correct problems prior to requesting the SOC.

VI. PREDICTED COMPLIANCE SCHEDULE:

The applicant must submit a detailed listing of activities along with time frames that are necessary to bring the facility into compliance. This schedule should include milestone dates for beginning construction, ending construction, and achieving final compliance at a minimum. In determining the milestone dates, the following should be considered:

- Time for submitting plans, specifications and appropriate engineering reports to DWR for review and approval.
- Occurrence of major construction activities that are likely to affect facility performance (units out of service, diversion of flows, etc.) to include a plan of action to minimize impacts to surface waters.
- Infiltration/Inflow work, if necessary.
- Industrial users achieving compliance with their pretreatment permits if applicable.
- Toxicity Reduction Evaluations (TRE), if necessary.

VII. FUNDING SOURCES IDENTIFICATION:

The applicant must list the sources of funds utilized to complete the work needed to bring the facility into compliance. Possible funding sources include but are not limited to loan commitments, bonds, letters of credit, block grants and cash reserves. The applicant must show that the funds are available, or can be secured in time to meet the schedule outlined as part of this application.

If funding is not available at the beginning of the SOC process, the permittee must submit a copy of all funding applications to ensure that all efforts are being made to secure such funds.

Note: A copy of the application should be sufficient to demonstrate timeliness unless regional office has reason to request all information associated with securing funding.

THE DIVISION OF WATER RESOURCES WILL NOT ACCEPT THIS APPLICATION PACKAGE UNLESS ALL OF THE APPLICABLE ITEMS ARE INCLUDED WITH THE SUBMITTAL.

Required Items:

- a. One original and two copies of the completed and appropriately executed application form, along with all required attachments.
 - If the SOC is for a City / Town, the person signing the SOC must be a ranking elected official or other duly authorized employee.
 - If the SOC is for a Corporation / Company / Industry / Other, the person signing the SOC must be a principal executive officer of at least the level of vice-president, or his duly authorized representative.
 - If the SOC is for a School District, the person signing the SOC must be the Superintendent of Schools or other duly authorized employee.

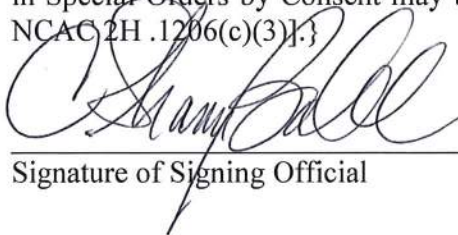
Note: Reference to signatory requirements in SOCs may be found in the North Carolina Administrative Code [T15A NCAC 2H .1206(a)(3)].

- b. The non-refundable Special Order by Consent (SOC) processing fee of \$400.00. A check must be made payable to The Department of Environment and Natural Resources.
- c. An evaluation report prepared by an independent consultant with expertise in wastewater. (in triplicate)

APPLICANT'S CERTIFICATION:

(NO MODIFICATION TO THIS CERTIFICATION IS ACCEPTABLE)

I, Shannon Baldwin, Town Manager, attest this application for a Special Order by Consent (SOC) has been reviewed by me and is accurate and complete to the best of my knowledge. I understand if all required parts of this application are not completed and if all required supporting information and attachments are not included, this application package may be returned as incomplete. *(Please be advised that the return of this application does not prevent DWR from collecting all outstanding penalties upon request).* **Furthermore, I attest by my signature that I fully understand that an upfront penalty, which may satisfy as a full settlement of outstanding violations, may be imposed.** {Note: Reference to upfront penalties in Special Orders by Consent may be found in the North Carolina Administrative Code [T15A NCAC 2H .1206(c)(3)].}



Date 06/19/2020

Signature of Signing Official

Shannon Baldwin

Printed Name of Signing Official

THE COMPLETED APPLICATION PACKAGE, INCLUDING THE ORIGINAL AND TWO COPIES OF ALL SUPPORTING INFORMATION AND MATERIALS, SHOULD BE SENT TO THE FOLLOWING ADDRESS:

NORTH CAROLINA DIVISION OF WATER RESOURCES
POINT SOURCE BRANCH
1617 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1617

IF THIS APPLICATION IS FOR A NON-DISCHARGE SYSTEM, THEN SEND TO:

NORTH CAROLINA DIVISION OF WATER QUALITY
AQUIFER PROTECTION SECTION
1636 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1636

Attachments

III. ADDITIONAL FLOW OR FLOW REALLOCATION:

No additional flow is requested.

IV. NECESSITY NARRATIVE:

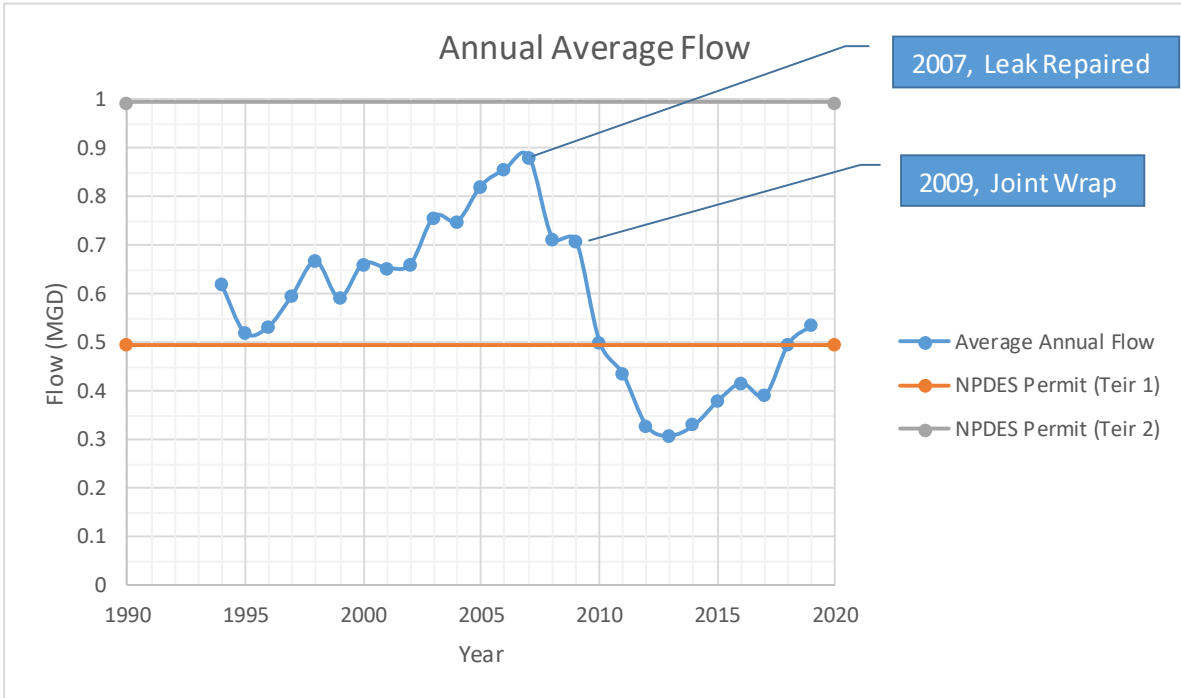
The Plant was originally constructed as a 0.350 MGD activated sludge plant in 1969. The subaqueous sanitary sewer (SASS) was constructed around 1926, prior to filling the lake. Before the construction of the Plant, the SASS discharged directly into the Broad River. In 1991, the Plant was renovated and converted into a physical-chemical process (P/C) and was permitted for an annual average daily flow rate of 0.995 MGD. In 2019, geotubes were installed to improve sludge handling, with marginal results. The plant continues to struggle to meet the NPDES permit limits during the winter and routinely fails to meet them in the summer months, particularly in the recently imposed ammonia limits. The root cause of the issues with the Plant are the lake infiltration. This flow enters the SASS at numerous points along its 14 mile length of submerged cast iron pipe, manholes, and private laterals. The flow is such that the wastewater is diluted to the extent that use of the activated sludge process is not possible and was the driving force in the conversion to a physical-chemical plant. In addition to the issues the infiltration creates with the Plant today, the already excessive infiltration is worsening as the pipe ages beyond its useful service life. NC DEQ's recognition of this, as well as the potential catastrophic consequences of a significant pipe failure resulted in their declaration of the SASS as noncompliant as well. Unfortunately, the current treatment process is ineffective in meeting some of the parameters of the plant's NPDES permit. The Plant has a legacy of frequent NPDES violations that is expected to continue unless changes are made to the Plant or collection system, or both. The current P/C process was not designed to remove ammonia, as such the Plant will continue violate the NPDES ammonia limits. The plant is currently considered "noncompliant" by the NC DEQ, with the most frequently cited NOV's being in regards to total suspended solids, ammonia, and flow. In addition, the operations of the Plant represents a considerable expenditure on Town's budget. This is only expected to increase due to the necessity of capital improvements and material and chemical cost increases. A summary of the plant history is provided below:

In addition to the residents of Lake Lure, the Town also serves several public and private collection systems. The magnitude of the flow received from these systems is described in the collection and treatment systems evaluation. There is currently not a pretreatment system on any of the connecting independent collection systems. The Town also does not have any industrial waste users, as such they have not completed an industrial waste survey.

The path forward is in the early stages of definition. The Town has taken certain steps related to the SASS. In 2007, the Town undertook a project to smoke test and video as much of the SASS as was accessible. A significant submerged joint leak was identified and repaired. In addition, a pipe wrap project was undertaken in 2009 to wrap the exposed joints in the SASS. The manufacturer recommended service life of the pipe wrap is 15 years. The effectiveness of these efforts is seen in the chart below, it should be noted that the graph also shows an upward trend after 2013. Also in 2019 while the lake was lowered twelve feet to accommodate penstock rehabilitation on the dam, the Town took the opportunity to have the exposed backshore area

topographically surveyed. As a risk mitigation measure, the Town installed a mainline valve on the gravity sewer below the dam, which would allow the stoppage of a catastrophic leak in the subaqueous main while repairs are made. The Town has installed a flow meter on the Rutherford county line serving Chimney Rock Village that is believed to contribute inflow and infiltration and to quantify those flow contributions. The Town has secured an SRF loan in the amount of \$12.5M to begin the replacement or rehabilitation of the SASS and Plant. To that end, the Town has engaged LaBella to develop the ER-EID to define the replacement alternative, scope, and schedule for achieving short-term, mid-term, and long-term NPDES compliance of both the Plant and the collection system. Prior to these efforts, the Town investigated a couple of alternatives which were determined to be either cost-prohibitive or otherwise infeasible. To investigate the best alternatives to consider, the Town commissioned a Technical Memorandum that lays out eleven alternatives for correction of the excessive infiltration issues and for each one, considers benefits and liabilities, identifies an order-of-magnitude cost and provides LaBella's recommendation as to whether to continue its evaluation or eliminate it from further consideration. These recommendations are summarized in the table on the following page, along with indication of which alternatives could accommodate a phased approach. Five alternatives are recommended for further consideration, which LaBella is proposing to develop as the next task in the Town's renewed effort to resolve this urgent infrastructure issue. A summary of the SASS history is below:

- 1926 - Initial Construction
- 1927 - Submerged following Dam construction
- 1969 – Initial Construction as a 0.350 MGD activated sludge plant
- 1991 – Conversion to a 0.995 MGD PC process
- 1991-2006 – Sand filter bypassed due to I&I
- 2007 – Town entered into an SOC
- 2007 – CCTV, smoke testing, joint repair project
- 2008 – Plant upgrade including screen, sludge removal, sampling, chemical feed and other improvements.
- 2009 – Pipe wrap project - \$3M (grant funded)
- 2009 – NPDES permit issued with more stringent limits and additional testing
- 2019 – Installation of geotubes for sludge management
- 2019 – Geotechnical exploration & report - \$35K
- 2019 – Installation of emergency access valve



When the lake infiltration issue is resolved, the Plant compliance issue will become more readily (technically) solvable, and so the timing of the Plant solution will depend on the progress of the collection system resolution. As the SASS replacement progresses, the lake infiltration will be reduced and the concentration of the wastewater will increase. This increase is necessary to achieve biological treatment, however it will cause issues with effluent compliance until biological treatment can begin. Timing and other particulars of the Plant solution (e.g., rehabilitation or replacement, facility location, process selection) will be identified in coordination with the selection of a collection system alternative. As a short-term compliance measure, the Town is applying for a Special Order by Consent (SOC) with NC DEQ to prevent additional NOV's and fines.

Subaqueous Sanitary Sewer Alternatives

Alternative	Cost Order of Magnitude	Phase-able	Consider Further
S1 - Do Nothing	n/a		
S2 - Land-based Low Pressure Sewer System	\$50M - \$65M	✓	
S3 - Backshore Low Pressure Sewer System	\$30M - \$40M	✓	✓
S4 - Backshore Series Pump Station System	\$30M - \$40M	✓	✓
S5 - Backshore HDPE Gravity System	\$25M - \$35M	✓	
S6 - Backshore HDPE Gravity / Lift Station System	\$30M - \$40M	✓	✓
S7 - Subaqueous Accessible Manholes	\$20M - \$30M	✓	✓
S8 - Tethered Buoyant HDPE System	\$40M - \$50M		
S9 - Submerged HDPE System	Not Established		
S10 - Drain and Replace Approach (if Dam renovation drains lake)	Not Established		
S11 - Repair & Rehabilitate Perimeter Manholes (partial solution)	\$1M - \$3M	✓	✓

V. CERTIFICATION:



Town of
Lake Lure
est. 1927 North Carolina

Collection and Treatment Systems Evaluation

June 9, 2020



Maurice J. Walsh, P.E.



Table of Contents

I. Project Background.....	1
II. Description of the Current Process	3
III. Regulatory Compliance Assessment	6
IV. Proposed Phase I – Plant and SASS rehabilitation and replacement.....	8
V. Proposed SOC - NPDES Limits.....	9
Biochemical Oxygen Demand (BOD)	12
Total Suspended Solids (TSS)	12
Ammonia (NH ₃).....	12
Iron (Fe).....	13
Sanitary Sewer Overflow (SSO).....	13

Acronym List

BOD	Biochemical Oxygen Demand
CI	Cast Iron
Fe	Iron
GPM	Gallons per Minute
I&I	Inflow and Infiltration
MGD	Million Gallons per Day
NC DEQ	North Carolina Department of Environmental Quality
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
P/C	Physical / Chemical
SSO	Sanitary Sewer Overflow
TSS	Total Suspended Solids
WWTP	Wastewater Treatment Plant

I. Project Background

The Town currently owns and operates a 0.995 MGD wastewater treatment plant (Plant) that uses a physical-chemical process to settle solids and provide disinfection. The current NPDES permit is NC0025381. The Plant was originally constructed as a 0.350 MGD activated sludge plant in 1969. Prior to this, the wastewater was discharged directly into the Broad River. In 1991, the Plant was renovated and converted into a physical-chemical process (P/C) and was permitted for an annual average daily flow rate of 0.995 MGD. The plant continues to struggle to meet the NPDES permit limits during the winter and routinely fails to meet them in the summer months. The main cause of the issues with the Plant are the lake infiltration and inflow and infiltration from the connecting land-based collection systems. These flows are such that the wastewater is diluted to the extent that use of the activated sludge process is not possible, which was the driving force in converting to a physical-chemical plant. Unfortunately, the current treatment process is ineffective in meeting some of the parameters of the plant's NPDES permit. The Plant has a legacy of frequent NPDES violations that is expected to continue unless changes are made to the Plant and collection system. The current P/C process was not designed to remove ammonia, as such the Plant will continue violate the NPDES ammonia limits. The plant is currently considered "noncompliant" by the NC DEQ, with the most frequently cited NOV's being in regards to total suspended solids, ammonia, and flow.

The NPDES permit is a two tier permit. The tiers are based on the average annual daily flow of the previous year. The two tiers are based on a flow of 0.495 MGD and 0.995 MGD and are indicated in the tables below.

NPDES Permit

Effluent Characteristics	Limits		
	Monthly Average	Weekly Average	Daily Maximum
Flow	0.495 MGD		
BOD, 5-day	30.0 mg/L	45.0 mg/L	
Total Suspended Solids	30.0 mg/L	45.0 mg/L	
NH ₃ as N (April 1- October 31)	9.4 mg/L	28.2 mg/L	
NH ₃ as N (Nov 1 - March 31)	Monitor and Report		

II. Description of the Current Process

The physical-chemical process involves dosing the wastewater with alum to facilitate the settlement of the suspended solids. The 350,000 gallon existing aeration basin was converted into a sediment basin, where the floc is allowed to settle. The settled sludge is pumped into a holding tank and disposed of by land application. The disinfection is accomplished with the addition of an oxidizer, sodium hypochlorite. Excess chlorine residual is removed by calcium thiosulfate. The sludge holding tank is only 50% utilized as a result of structural deficiencies that allow sludge to leak if completely filled. The table below demonstrates the detention time of the current process. For comparison, the current detention time requirement for a water plant sedimentation basin is 4 hours per the 10 States Standards, 2012 edition.

Current Treatment Process		
Design Flow	0.995	MGD
2019 AAF	0.5355	MGD
Tier 1 Flow	0.495	MGD
Volume of Basin	330000	Gal
Detention Time		
Design Flow	7.960	Hrs
2019 AAF	14.790	Hrs
Tier 1 Flow	16.000	Hrs

The DMR table below highlights the challenges faced by the Plant in meeting the NPDES permit limits. This is particularly acute for the ammonia limit as can be seen in the graph below. The Plant exceeded the monthly average ammonia limit twenty-two (22) times during the summer months from 2015 to 2019. The NPDES permit does not require influent sampling, as a result limited influent characteristics data is available. The information presented in this assessment is effluent data, with the exception of the flow data.

DMR Data (2015-2018)

Description	BOD		TSS		NH ₃ (Summer)	
	mg/L	Limit	mg/L	Limit	mg/L	Limit
Max Monthly	25.3	30	23.4	30	15.2	9.4
Average Monthly	11.3	30	22.0	30	10.2	9.4
Max Weekly	26.1	45	26.3	45	8.3	28.2
Average Weekly	7.2	45	26.2	45	2.9	28.2

II. Description of the Current Process

The physical-chemical process involves dosing the wastewater with alum to facilitate the settlement of the suspended solids. The 350,000 gallon existing aeration basin was converted into a sediment basin, where the floc is allowed to settle. The settled sludge is pumped into a holding tank and disposed of by land application. The disinfection is accomplished with the addition of an oxidizer, sodium hypochlorite. Excess chlorine residual is removed by sulfur dioxide. The sludge holding tank is only 50% utilized as a result of structural deficiencies that allow sludge to leak if completely filled. The table below demonstrates the detention time of the current process. For comparison, the current detention time requirement for a water plant sedimentation basin is 4 hours per the 10 States Standards, 2012 edition.

Current Treatment Process		
Design Flow	0.995	MGD
2019 AAF	0.5355	MGD
Tier 1 Flow	0.495	MGD
Volume of Basin	330000	Gal
Detention Time		
Design Flow	7.960	Hrs
2019 AAF	14.790	Hrs
Tier 1 Flow	16.000	Hrs

The DMR table below highlights the challenges faced by the Plant in meeting the NPDES permit limits. This is particularly acute for the ammonia limit as can be seen in the graph below. The Plant exceeded the monthly average ammonia limit twenty-two (22) times during the summer months from 2015 to 2019. The NPDES permit does not require influent sampling, as a result limited influent characteristics data is available. The information presented in this assessment is effluent data, with the exception of the flow data.

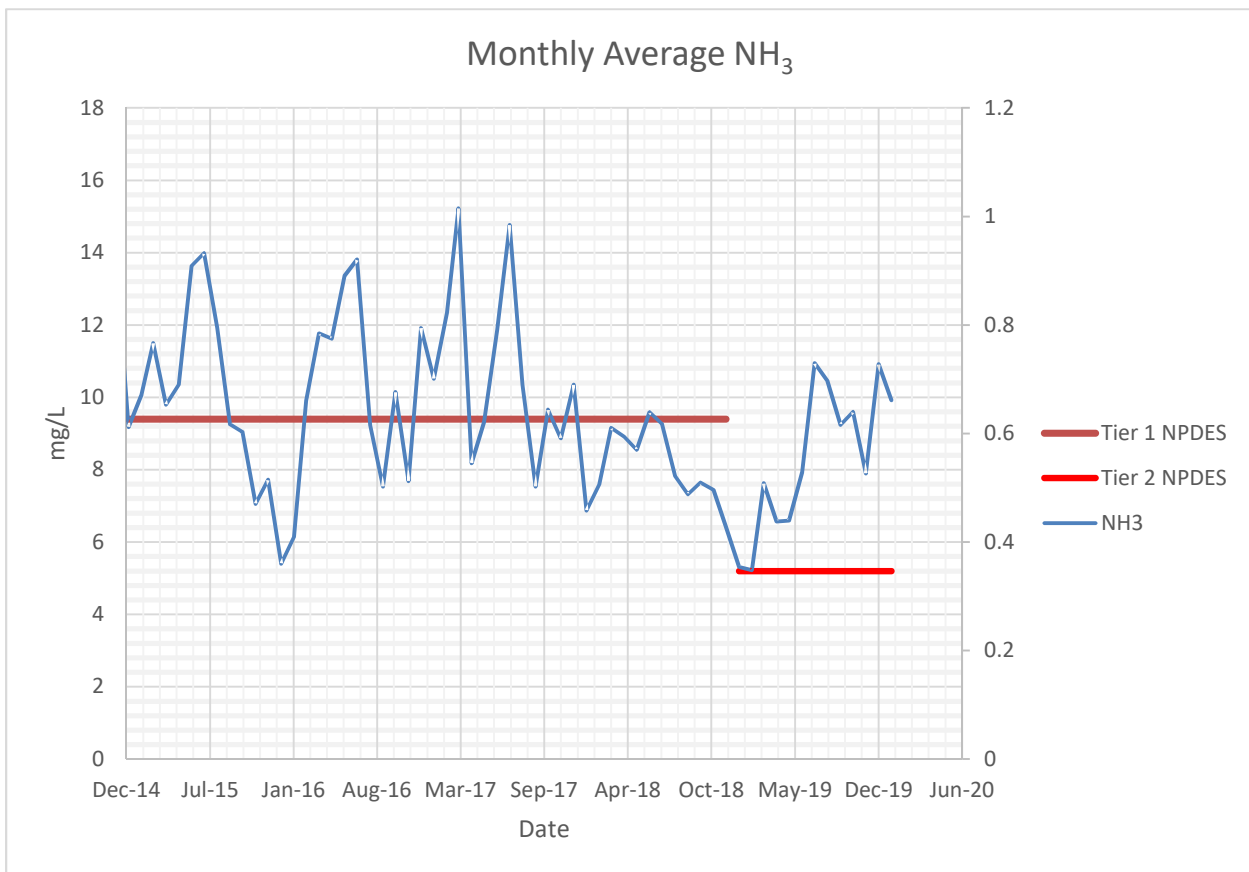
DMR Data (2015-2018)

Description	BOD		TSS		NH ₃ (Summer)	
	mg/L	Limit	mg/L	Limit	mg/L	Limit
Max Monthly	25.3	30	23.4	30	15.2	9.4
Average Monthly	11.3	30	22.0	30	10.2	9.4
Max Weekly	26.1	45	26.3	45	8.3	28.2
Average Weekly	7.2	45	26.2	45	2.9	28.2

DMR Data (2019)

Description	BOD		TSS		NH ₃ (Summer)	
	mg/L	Limit	mg/L	Limit	mg/L	Limit
Max Monthly	15.2	30	23.5	30	10.9	5.2
Average Monthly	7.9	30	21.3	30	8.8	5.2
Max Weekly	20	45	25.8	45	7.6	15.6
Average Weekly	14.4	45	25.8	45	3.0	15.6

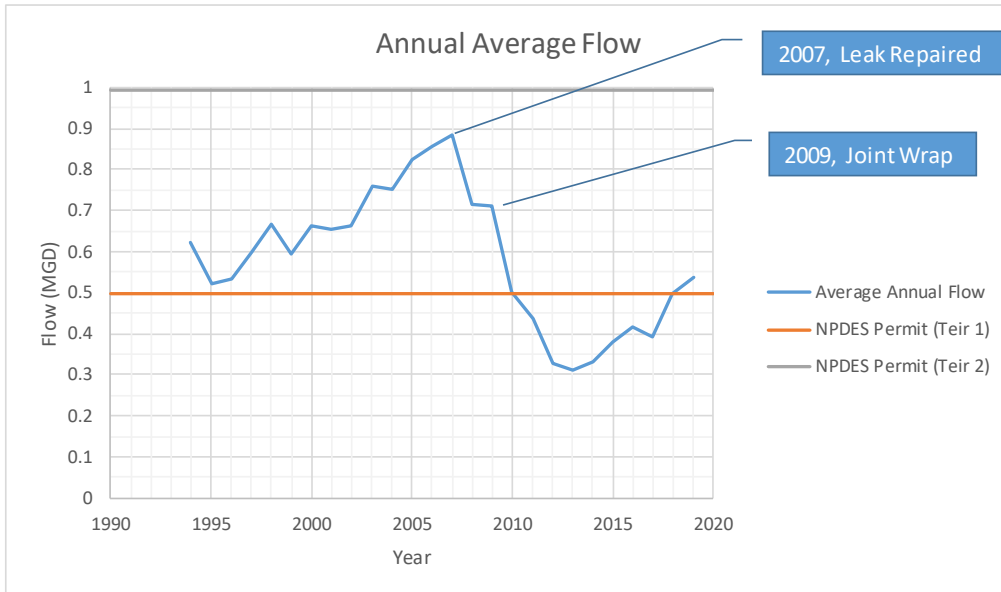
Occurred during monitor and report period



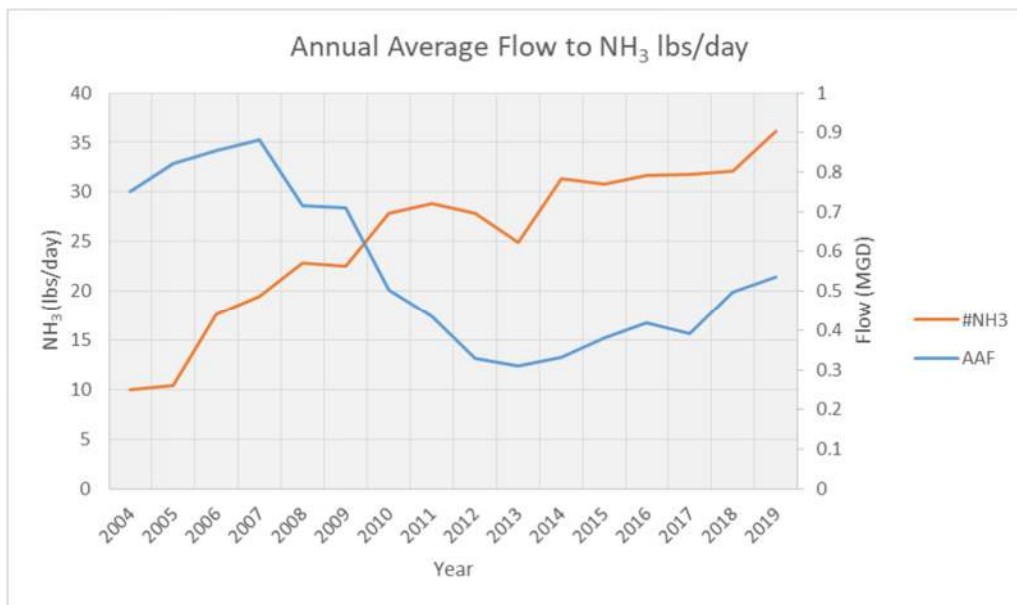
The Town has made changes in 2019 to the sludge handling by the addition of geotubes to thicken and dewater sludge. These have only been marginally effective due to the high moisture content of the sludge. The Town staff is investigating different methods of sludge handling to improve efficiency and reduce operational cost.

The peak flow rates in the SASS is predominately determined by the lake infiltration, pipe degradation, and I&I of connecting systems, such as Chimney Rock Village. This is shown in

the average annual flow from 1994 to 2019 in the chart below. Two repairs are shown that dramatically reduced the flow rate.



The chart below shows the average daily flow rate contrasted with the pounds per day of ammonia. The concentration of ammonia in a predominately residential wastewater stays fairly constant. The increase in pounds per day of ammonia is what would be expected given the general growth rate of the population of the sewer shed. Typically the amount of ammonia would correlate with changes in the flow rate, however in this case the change in daily ammonia content is independent of the change in average daily flow. This further confirms that the flow rate in the SASS is greatly influenced by lake infiltration and inflow and infiltration from the land based and connecting systems.



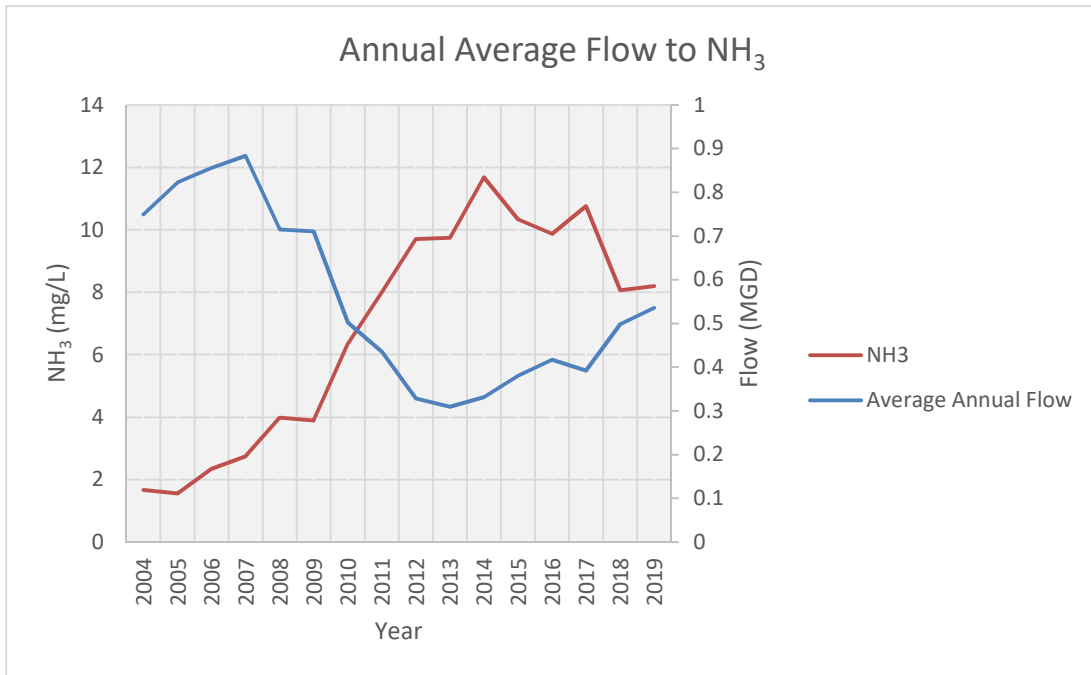
III. Regulatory Compliance Assessment

The Plant and SASS have a legacy of noncompliance that is a direct result of the lake infiltration and from the inflow and infiltration of connecting land-based sewer systems. This inflow and infiltration diluted the wastewater flow to the extent that biological treatment was not possible. In 1991, the plant was converted to a P/C process. This process can provide for BOD and TSS removal settling the suspended solids in the wastewater. The detention times for BOD and TSS removal are significantly shorter than that required for ammonia removal. The detention time shown in section II are generally sufficient for BOD and TSS removal. The detention time for ammonia removal is generally estimated at 5 to 7 days and require higher water temperature and additional dissolved oxygen¹. The table below demonstrates the flow capacity of the plant to remove ammonia. As the table indicates, the estimated design flow for ammonia removal would be 0.0471 MGD (47,100 GPD) or about 8.80% of the 2019 flow rate. Ammonia exists in wastewater in two forms, as a gas (NH₃) or as the ion ammonium (NH₄). The proportion of the two forms is pH dependent. Regardless of the form of ammonia, the current process is incapable of ammonia removal in any significant capacity. As a result, it would be expected that the vast majority of ammonia in the influent will exit in the effluent.

Ammonia Removal		
Detention Time	7	Days
Volume of Basin	330,000	Gal
Available Capacity	0.0471	MGD
Percent of 2019 AAF	8.80%	

The Town is currently undertaking steps with the ultimate goal of returning the plant to a biological process. A critical step in this task is removing the lake infiltration from the system. It is important to note that the lake infiltration is not the source of the ammonia, and only serves to dilute the ammonia. Consequently, as the Town reduces the infiltration, the ammonia concentration will increase. The chart below graphs the annual average flow vs. the annual average ammonia concentrations, and demonstrates this point. As the flow rate decreases the ammonia concentration increases and vice versa. In contrast when the concentration is normalized with the flow rates as pounds of ammonia per day in the chart above, this demonstrates that the amount of ammonia entering the system does not correlated with the observed flow rate.

¹ Nye, Joe “Addressing the Challenge of Removing Ammonia from Wastewater”, WaterWorld, March 2010, online



The expected increase in concentration as the flow decreases demonstrates the continued noncompliance with the NPDES permit. The Town must reduce the flow considerably in order to return to biological treatment. However, the current infrastructure and operation of the plant cannot be optimized or modified without additional processes or equipment to treat the ammonia. As such, the plant will continue to release effluent that is out of compliance with the NPDES permit limit until such time as the Plant undergoes a substantial rehabilitation or replacement.

The Town also has issues meeting the TSS limits. This is primarily due to the limited ability to process and store solids. The existing storage tank can only be filled approximately 50%, which eliminates the ability to thicken the sludge and decant. This reduces the ability of the Plant staff to transfer solids from the sedimentation basin and increases the cost and frequency of third-party solids removal. The solids removal issue reduces the Plant's capacity to settle BODs and TSS, and increases the risk of non-compliance, particularly during a high flow event. At the time of this writing, the sedimentation basin is in need of solids removal due to the availability of room in the sludge holding tank and the financial cost of disposal. The Town is in the process of awarding a contract to remove the solids accumulated in the Plant, and has tasked LaBella with investigating operational and process changes to more efficiently settle solids and address the sludge removal. Recent Influent sampling test have revealed that the Plant has much higher TSS than would be expected from a typical WWTP.

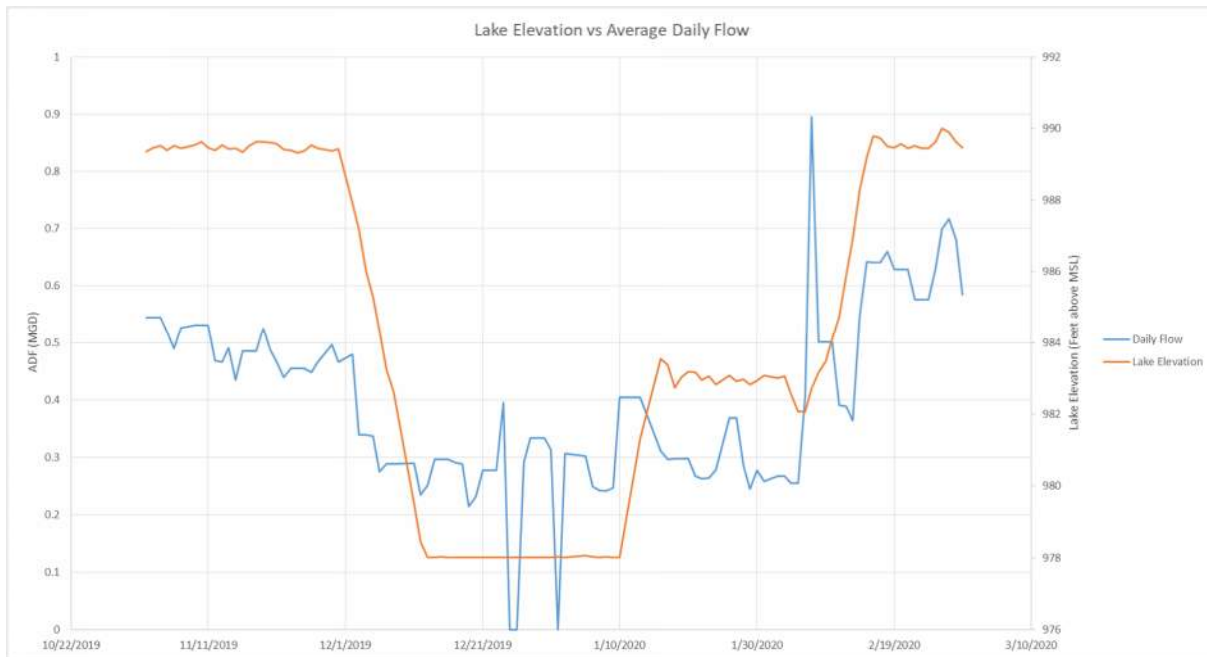
In addition to issues with the Plant, the Town also has regulatory compliance issues with the SASS. The primary infractions with the SASS are SSOs from lake infiltration and inflow and

infiltration and the risk of catastrophic failure. The Town has little ability to influence the flow factors that affect the SSOs. The Lake infiltration occurs at various elevations in lake from the surface to approximately 90' at the dam. The SASS is very inaccessible, which makes repairs and rehabilitation difficult to extremely difficult in the lower elevations and moderate to difficult in the higher elevations. In addition, the Town has limited ability to affect changes or improvements in the independent connecting land based systems. It is expected that the flow rate in SASS would continue to increase as connecting systems and SASS continue to age and degrade. If the flow rate in the SASS exceeds the headworks pumping station at the Plant, an SSO will occur. In this event, the only recourse to the Town is to monitor and report the SSO. As the collection system continues to deteriorate, it is expected that the potential for and magnitude of SSOs would increase.

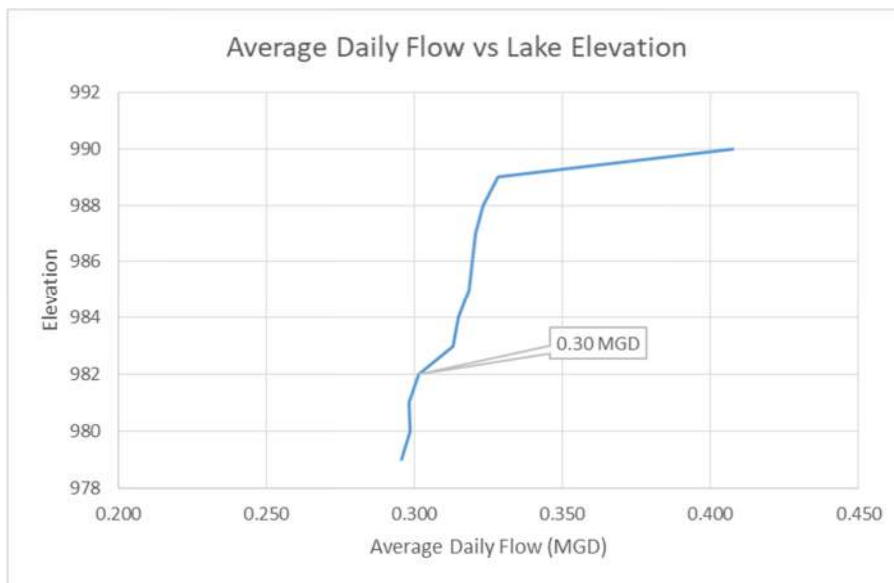
The remaining compliance issue is with catastrophic failure of the SASS. Catastrophic failure is defined as a pipe failure that results in a continuous and uncontrollable SSO. Due to the inaccessibility of the SASS, it is impossible to do a pipe condition assessment along the full extent of the line. While we are not able to determine when a condition like this may occur, it is highly probable that such a failure will occur at some point in the future. To mitigate this risk, the Town has installed a shut off valve on the sewer line at the dam which would allow for the flow from the SASS to be regulated to stop a continuous SSO. This is incorporated in the attached Emergency Action Plan (EAP), which layouts how to determine a catastrophic event and a sequence of actions to perform in the attempt to repair the SASS.

IV. Proposed Phase I – Plant and SASS rehabilitation and replacement

The Town is currently engaged in phased project that is intended to provide for the complete replacement and rehabilitation of the Plant and SASS. The ultimate goal is long-term regulatory compliance. The first phase of this plan is currently under development, but consists of short-term, mid-term, and long-term improvements to achieve the ultimate goal. The short-term solution is the current SOC application. During the time period of the SOC, the Town is intending to execute mid-term and long-term improvements. The mid-term improvements involve the rehabilitation of the existing manholes and improvements to the Plant. The long-term improvements are related to a partial replacement of the SASS. The mid-term improvements are intended to improve the operations of the Plant and to reduce the lake infiltration of the SASS. Based on historic flow levels during various in lake elevation, it is readily apparent that significant amount of lake infiltration occurs in the upper 12 feet of lake elevation. The following chart shows the lake elevation vs average daily flow rates during a period when the lake was lowered to its current lowest available elevation. To provide additional capacity against a catastrophic failure of the SASS, a sewer access valve will be installed at the base of the dam to allow for the draining of the lake reservoir. This functionality has been integrated into the ERP.



The graph below shows the average daily flow vs lake elevation and demonstrates the target flow reduction of the phase 1 project. This target is the dry weather average daily flow is 0.300 MGD.



V. Proposed SOC - NPDES Limits

The information presented thus far demonstrates that the current process is incapable of being operated in a manner that would comply with the NPDES limits. The Town is currently working toward the ultimate rehabilitation or replacement of the SASS and Plant. These projects are closely interrelated, so improvements to the SASS have a direct impact on the Plant.

The Historic Effluent DMR data is summarized on the table below, and further demonstrates the inability of the Plant to meet the NPDES limits.

Historic DMR Data (Jan/2004 - Jan/2020)

Description	BOD		TSS		NH ₃ (Summer)	
	mg/L	Limit	mg/L2	Limit	mg/L4	Limit
Max Daily	65.9	N/A	120	N/A	27.2	N/A
Average Daily	10.0	N/A	25.7	N/A	8.1	N/A
Max Weekly	52.1	45	26.3	45	22.3	28.2/15.6
Average Weekly	10.0	45	24.3	45	6.8	28.2/15.6
Max Monthly	32.4	30	26.3	30	17.1	9.4/5.2
Average Monthly	9.9	30	24.3	30	6.8	9.4/5.2

Until recently, composite influent test results were not available. The currently available influent and corresponding effluent limits are shown below, with the removal quantities.

Plant Composit Sampling										
Date	Influent (mg/L)			Effluent (mg/L)				Removal (mg/L)		
	BOD	TSS	NH ₃	BOD	TSS	NH ₃	Fe	BOD	TSS	NH ₃
4/21/2020	62	720	4.9	3.2	16	4.9		58.8	704	0
4/22/2020	47	220	5.4	3.2	18	5.7		43.8	202	-0.3
4/27/2020	76	360	5.3	3.2	29	5.9	11	72.8	331	-0.6
4/29/2020	54	300	4.9	3.4	23	5.5		50.6	277	-0.6
5/4/2020	80	350	4.6	4.4	13	4.9	0.078	75.6	337	-0.3
5/5/2020	24	50	4.4	4.4	20	4.4		19.6	30	0
5/19/2020	67	310	6.1	4.2	17	5.6		62.8	293	0.5
5/20/2020	38	260	3.4	3.4	19	3.7		34.6	241	-0.3
Average	56.00	321.25	4.88	3.68	19.38	5.08	5.54	52.33	301.88	-0.20

Sample consumed DO

The influent characteristics above were used to approximate the change in characteristics with reductions in lake infiltration. This was accomplished by using the average pounds per day of in each category and then calculating the concentration at various flow rates. The historic average removal efficiencies were used to estimate the effluent characteristics. These are shown in table and chart form below, and are the basis for the proposed SOC limits.

Estimated Average Monthly Characteristics

Flow MGD	Average Observed Removal			58%	50%	0%
	Influent (mg/L)			Effluent (mg/L)		
	BOD	TSS	NH3	BOD	TSS	NH3
0.10	358.78	2006.95	31.49	150.69	1003.47	31.49
0.15	239.18	1337.97	20.99	100.46	668.98	20.99
0.20	179.39	1003.47	15.75	75.34	501.74	15.75
0.25	143.51	802.78	12.60	60.27	401.39	12.60
0.30	119.59	668.98	10.50	50.23	334.49	10.50
0.35	102.51	573.41	9.00	43.05	286.71	9.00
0.40	89.69	501.74	7.87	37.67	250.87	7.87
0.45	79.73	445.99	7.00	33.49	222.99	7.00
0.50	71.76	401.39	6.30	30.14	200.69	6.30
0.55	65.23	364.90	5.73	27.40	182.45	5.73

Estimated Average Weekly Characteristics

Flow MGD	Average Observed Removal			58%	50%	0%
	Influent (mg/L)			Effluent (mg/L)		
	BOD	TSS	NH3	BOD	TSS	NH3
0.10	538.16	3010.42	47.24	226.03	1505.21	47.24
0.15	358.78	2006.95	31.49	150.69	1003.47	31.49
0.20	269.08	1505.21	23.62	113.01	752.61	23.62
0.25	215.27	1204.17	18.89	90.41	602.08	18.89
0.30	179.39	1003.47	15.75	75.34	501.74	15.75
0.35	153.76	860.12	13.50	64.58	430.06	13.50
0.40	134.54	752.61	11.81	56.51	376.30	11.81
0.45	119.59	668.98	10.50	50.23	334.49	10.50
0.50	107.63	602.08	9.45	45.21	301.04	9.45
0.55	97.85	547.35	8.59	41.10	273.67	8.59

The modified SOC limits represent what the Plant can be reasonable expected if operated at its maximum efficiency.

Biochemical Oxygen Demand (BOD)

The DMR data shows a high degree of variation in the Plant effluent BOD concentration. The Plant violated the monthly and weekly NPDES limits. This variation in BOD is reflective of the inefficiencies inherent in the Plant's current process. The proposed SOC limits for average monthly and weekly are 60.0 mg/L and 90.0 mg/L respectively, and are reflective of the Plant's ability to remove BOD based on historical data from 2004 to present.

Total Suspended Solids (TSS)

The DMR data shows a fairly consistently, but high level of TSS. The average influent TSS was 321 mg/L. The daily maximum TSS during this period was 720 mg/L, which demonstrates the potential for TSS related NOV's. This is particularly the case as the system ages and as the phase 1 project is undertaken. The proposed SOC limits for average monthly and weekly are 340 mg/L and 510 mg/L respectively.

Ammonia (NH₃)

The DMR data shows a high degree of variation in the Plant ammonia effluent concentration and an inverse relationship with the flow rate. The table below shows the limitedly available influent, effluent ammonia concentrations and the removal percentages. The data confirms that the plant does not remove ammonia. In fact, the solids handling issues at the plant are such that the removal percentages are negative. The Town is currently bidding a project to remove and alleviate this issue, however the process will continue to allow ammonia to "pass through" the Plant. The maximum monthly average in pounds per day measured 64.7 pounds and occurred in July 2014. The maximum weekly in pounds per day measured 81.4 pounds and occurred in July 2017. The daily maximum in pounds per day measured 116 pounds and occurred in August 2011. As the flow rates decrease, the concentration of ammonia will increase. Given that the current process cannot remove ammonia, the effluent concentrations increase accordingly. The high variation in ammonia concentrations, and the realization that improvements to the SASS will increase these concentrations, makes the estimation of the estimated ammonia concentrations speculative. As such, the Town is proposing the SOC limits for average monthly and weekly would be monitor and report for both the summer and winter limits during the SOC period.

Ammonia Concentrations

Date	Influent (mg/L)	Effluent (mg/L)	%- Removal
4/21/2020	4.9	4.9	0.0%
4/22/2020	5.4	5.7	-5.6%
4/27/2020	5.3	5.9	-11.3%
4/29/2020	4.9	5.5	-12.2%
5/4/2020	4.6	4.9	-6.5%
5/5/2020	4.4	4.4	0.0%
5/19/2020	6.1	5.6	8.2%
5/20/2020	3.4	3.7	-8.8%
Average	4.875	5.075	-4.53%

Iron (Fe)

The level of iron in the wastewater received by the Plant has long been a source of curiosity for the Town. In an effort to determine the source of the iron, we took samples from the Lake itself and determined by the iron content of the lake water was 0.387 mg/L on average. The historic average iron effluent is 30.03 mg/L, which is over 77 times the lake concentration. It is conclusive that the lake water and naturally occurring iron are not the primary source of the iron. Based on videos of the pipe condition, it is believed that the CI pipe itself is the source of the iron as it daily degrades. The full effect of iron on a potential biological process is still being investigated. The current NPDES requirements for iron is monitor and report. The Town would propose that this requirement would remain as part of the SOC.

Sanitary Sewer Overflow (SSO)

The Town is unable to consistently comply with the conditions set forth in Section I, paragraph 2 of permit WQCS00131 as it relates to SSOs corresponding to General Statutes 15A NCAC 02T.0108. The Town would propose to meet all the terms and conditions of the permit, except in relation to Section I, paragraph 2 mentioned above. The Town shall make every effort to prevent the discharge of wastewater to the ground or surface waters, and shall engage in a phased project to reduce the lake infiltration, to reduce the potential for and magnitude of an SSO.

The table below summarizes proposed modified SOC limits.

Proposed SOC Limits

Parameter	Units	Permit Limits		Modified Limits (SOC)	
		Mnthly Avg.	Weekly Avg.	Mnthly Avg.	Weekly Avg.
Biochemical Oxygen Demand (BOD)	mg/L	30.0	45.0	60.0	90.0
Total Suspended Solids (TSS)	mg/L	30.0	45.0	340	510
NH ₃ - N (April 1-Oct 31)	mg/L	9.4	28.2	Monitor & Report	
Fe	mg/L	Monitor & Report		Monitor & Report	

VI. PREDICTED COMPLIANCE SCHEDULE:

The Table below establishes a number of milestones and completion dates. These milestones will need to be completed as part of the process to achieve long-term NPDES compliance. However, these steps alone will not achieve long-term compliance. The steps below are attempting to achieve short and mid-term compliance in a multiphase, multiple year project. This phasing is due to the realities of the complexity of the infrastructure issues and financial cost of the improvements compared with the financial abilities of the Town. These steps are a large part of the process, with the remaining step following as funding becomes available.

SOC Compliance Schedule	
Milestones	Completion Date
Issue Request for Qualifications for On-Call Services	11/4/2019
Interview Qualified Firms	1/7/2020
Award On-Call Services	1/14/2020
Present Technical Memo to NC DEQ, UAB, and Town Council	1/29/2020
Pre-application Meeting	2/12/2020
Install meter to monitor ADF and I&I from Rutherford County line serving CRV	4/15/2020
Develop a lake infiltration model	6/26/2020
Collect composite influent samples at WWTP	7/3/2020
Present flow, I&I, and composite effluent findings to DWR	7/10/2020
Complete AIA grant application	9/30/2020
Complete Phase 1 design	3/1/2021
Phase 1 Permitting	5/1/2021
Complete Phase 1 Construction	4/30/2022

VII. FUNDING SOURCES IDENTIFICATION:

- The Town is currently preapproved for a \$12.5 million CWSRF loan, and is in the process of completing the ER-EID necessary to finalize the funding. A copy of the intent to fund is attached.
- The Town will apply for an AIA grant from the State of North Carolina. These grants are up to \$150K and allow for the inventory and condition assessment of existing assets.
- The Town has increased utility rates and is evaluating future rate increases to fund debt service, consulting, and other cost related to capital improvement projects.



PAT MCCRORY

Governor

DONALD R. VAN DER VAART

Secretary

KIM H. COLSON

Director

August 1, 2016

Mr. Ron Nalley, Manager
Town of Lake Lure
P.O. Box 255
Lake Lure, NC 28746

SUBJECT: Clean Water State Revolving Fund
Letter of Intent to Fund
Greenline
April 2016 Application Cycle
Project No. CS370489-05

Dear Mr. Karr:

The Division of Water Infrastructure has reviewed your application to the Clean Water State Revolving Fund (CWSRF) program, and the State Water Infrastructure Authority has approved your project as eligible to receive a low-interest loan. The total loan amount will be \$12,580,261. \$500,000 of the total loan will be in the form of principal forgiveness and the balance will have a maximum interest rate of 0%. A loan fee of 2% will be invoiced after bids have been received.

Please note that this intent to fund is contingent on approval of the loan through the Local Government Commission and on meeting **all** of the following milestones:

<u>Milestone</u>	<u>Date</u>
Engineering Report Submittal	December 1, 2016
Engineering Report Approval	May 1, 2017
Bid and Design Package Submittal	November 1, 2017
Bid and Design Package Approval	March 1, 2018
Advertise Project, Receive Bids, Submit Bid Information, <u>and</u> Receive Authority To Award	July 2, 2018
Execute Construction Contract(s)	August 1, 2018

The first milestone is the submittal of an Engineering Report by close of business on December 1, 2016. The Engineering Report must be developed using the updated guidance found on our website (<http://portal.ncdenr.org/web/wi/home>). **Failure to meet any milestone may result in the forfeiture of funding for the proposed project.**



Mr. Ron Nalley, Manager
August 1, 2016
Page 2 of 2

Upon detailed review of the project during the funding process, it may be determined that portions of your project are not eligible for funding and the total loan amount may be reduced. Additionally, changes in the scope or priority points awarded – based on additional information that becomes apparent during project review – may also result in changes to the total loan amount and loan terms.

Davis-Bacon Requirements and American Iron and Steel Provisions

Projects funded through the CWSRF program must comply with Davis-Bacon wage requirements and American Iron and Steel provisions. You can find standard specifications covering these requirements on our website.

General Assembly Notification Requirements

In accordance with G.S. 120-157.1 through 157.9, enacted on June 24, 2011, local government units with projects that require debt to be issued greater than \$1,000,000 **must** submit a letter to Committee Chairs, Committee Assistant, and the Fiscal Research Division of the General Assembly at least 45 days prior to presentation before the Local Government Commission. You are responsible for submitting this letter and providing a copy to the Division of Water Infrastructure upon receipt of this approval letter.

Brooks Act Compliance

Projects funded through the CWSRF program must comply with the federal Brooks Act for the selection of architectural and engineering services. CWSRF projects cannot be exempted from qualification based selection of these services under N.C.G.S. 143-64.32. The attached form will need to be submitted as documentation of compliance for any services to be reimbursed. Any services provided that were not selected in compliance with federal requirements will be ineligible for reimbursement.

If you have questions, please contact Seth Robertson, PE, Chief, State Revolving Fund Section at 919-707-9175.

Sincerely,



Kim H. Colson, P.E.

Attachment: PESP 4/11/16

CC: Harlow L. Brown, PE, Brown Consultants
Anita E. Reed, PE
Mark Hubbard, PE
SRF File

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State of North Carolina | Environmental Quality | Water Infrastructure

1633 Mail Service Center, Raleigh, North Carolina 27699 | Location 512 N. Salisbury Street, Raleigh, North Carolina 27604

919 707 9160 T

VIII. EMERGENCY RESPONSE PLAN



Collection System Emergency Response Plan

June 2020

Maurice J. Walsh, P.E.

Table of Contents

- I. Emergency Contacts..... 1**
- II. Emergency Alerting List 2**
- III. Purpose..... 2**
- IV. Situation and Assumptions 2**
- V. ERP Sequence of Actions 2**
 - Suggested Emergency Preparedness Actions..... 3
 - Sequence of ERP Events..... 3

I. Emergency Contacts

<u>Name</u>	<u>Organization</u>	<u>Phone Number</u>
Shannon Baldwin, City Mangager	Lake Lure	(828)625-9983
David Arrowood , PWD	Lake Lure	(828) 748-0550
Scott Bidby, Sewer Dpt. Sup.	Lake Lure	(828) 429-7415
Dean Lindsey, Dam/Hydro Dir.	Lake Lure	(828) 772-6134
Dustin Wacaster, Fire Chief	Lake Lure	(828) 442-4727

II. Emergency Alerting List

<u>Name</u>	<u>Organization</u>	<u>Phone Number</u>
Tim Heim, Env. Eng.	DWR – Asheville RO	(828) 989-7586
Mikal Willmer, Env. Sp. II	DWR – Asheville RO	(828) 989-7675

III. Purpose

This emergency response plan (ERP) has been developed to provide procedures for the Town of Lake Lure (Town) to respond to a catastrophic failure of the subaqueous sewer system (SASS) that results in a continuous and uncontrollable sanitary sewer overflow (SSO).

IV. Situation and Assumptions

The SASS consists of approximately 14 miles of cast iron pipe installed in the late 1920's, and placed adjacent to the broad river prior and then submerged as the lake was filled. The SASS is prone to lake infiltration, has undergone numerous repair projects, and a majority of the SASS is of an unknown condition. It is assumed that a failure in part of the line would result in a sustained flow that would present as an SSO at the headworks pumping station. This failure, if left unattended, would drain the lake above the failure and cause immediate economic, environmental, and social impact to both the Town of Lake Lure and the surrounding area.

V. ERP Sequence of Actions

The Town of Lake Lure staff and elected officials have primary responsibility for the SASS, and for maintaining, repairing, and reporting its condition to the related stake holders.

Suggested Emergency Preparedness Actions

- Interview and select a diving contractor with the relevant experience who could respond as quickly as possible to potential SASS failure and assist in the location and repair of said failure.
 - The emergency contact information for two or more representatives should be added to the emergency contact list.
- Lake Lure should procure and store the necessary repair materials that may reasonably be used to repair a SASS failure.
 - These should be stored in a known location and readily accessible to Town staff.
- Lake Lure should hold a training session annually with the Town staff over how to respond to a SASS failure.
- Until the completion of the SASS replacement, the Town of Lake Lure should include an ERP briefing in a public commissioners meeting on an annual basis.
- Lake Lure should investigate the best method for providing an emergency announcement to the Lake Lure community in the event of an SASS failure.
-

Sequence of ERP Events

- Upon the discovery of an SSO, Town staff shall respond to the head works pump station and assess the magnitude of the SSO event.
- Town staff should evaluate the operation of the pump station to determine if the SSO is the result of pumping failure or overwhelming flow from the SASS.
- In the event of pumping failure, the Town should take what actions are necessary to return the pump station to normal operations.
- If the pump station is fully operational, the Town staff shall access the cause of the excess flow, such as I&I from a rain event.
- Town staff should begin the SSO notification process that includes DWI – Asheville RO, Town Manager, and other elected officials.
- Town staff shall visually inspect the connection points with contributing systems such as Rumbling Bald and the County line serving Chimney Rock Village to determine if the SSO is a result of a failure in a connecting system.
- If the magnitude and duration of the SSO is such that it is continuous and uncontrolled, the Town shall begin the notification process of the individuals listed in Sections I and II.

- The Town shall begin the lake drawdown process subject to the established requirements and conditions until that lake level is reduced to its lowest level or the SSO stops, which ever come first.
- The Town shall notify the public of a potential SASS failure and shall restrict access to Lake Lure for staff, contractors, consultants, and related regulatory staff.
- The Town shall execute the closing procedures of the emergency shutoff valve to reduce the flow until the SSO is eliminated.
- The selected diving contractor/s shall be mobilized to begin searching for the leak.
- The Town shall throttle the emergency shut-off valve the extent that the subsequent flow and sound may be utilized in the search for the failure.
 - The flow rate shall not exceed the headworks pumping capacity.
 - This process shall take place with close coordination of applicable.
 - The emergency shut-off valve shall be continuously staffed when it is not fully closed for the duration of the failure event.
- ¹The Town shall activate the Sewer Access Valve and begin the lake drawdown process subject to the established requirements and conditions until that lake level is reduced to its lowest level or the SSO stops, which ever come first.
- Once the failure is located, the pipe shall be repaired, and the location documented.
 - If possible a coupon of the pipe shall be taken for further analysis.
 - The repair should be documented with video and/or photographs.
- The emergency access valve shall be opened slowly to drain the SASS and verify the failure event is suspended.
- Once the failure event has been resolved, the Town shall notify the public and emergency contacts that the situation is resolved.
- The Town shall restore the lake levels to normal and open the lake to normal operations

¹ The Sewer Access Valve is a proposed capability

PLANT COPY



North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 10, 2015

Mr. Chris Braund, Town Manager
Town of Lake Lure
P. O. Box 255
Lake Lure, NC 28746-0255

Subject: Issuance of NPDES Permit NC0025381
Town of Lake Lure WWTP
Rutherford County

Dear Mr. Braund:

Division personnel have reviewed and approved your application for renewal of the subject permit. Accordingly, we are forwarding the attached NPDES discharge permit. This permit is issued pursuant to the requirements of North Carolina General Statute 143-215.1 and the Memorandum of Agreement between North Carolina and the U.S. Environmental Protection Agency dated October 15, 2007 (or as subsequently amended).

This final permit contains the following changes to its terms from those found in the draft permit sent to you on December 17, 2014.

- An entry has been made on the limits and monitoring page referencing the upstream monitoring of flow, as required in condition A. (4.) of the permit.
- Citations have been added showing the regulatory justification for particular permit requirements.
- Updates have been made reflecting administrative changes within the permitting agency that have occurred since the draft permit was prepared.

You are also reminded of the new condition requiring electronic reporting of discharge monitoring report (DMR) data using the Division's eDMR internet application. This new requirement will become effective on December 1, 2015 (approximately 270 days or nine months following the effective date of the permit).

Please note that this section of the Broad River is listed as an impaired waterbody on the North Carolina 303(d) Impaired Waters List. This means that the stream does not meet all best uses associated with its classification. Addressing impaired waters is a high priority with the Division, and instream data will continue to be evaluated. If there is noncompliance with permitted effluent limits and stream impairment can be attributed to your facility, then mitigative measures may be required.

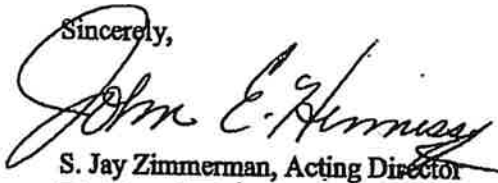
Mr. Chris Braund
NC0025381 Permit Renewal 2015
p. 2

If any parts, measurement frequencies or sampling requirements contained in this permit are unacceptable to you, you have the right to an adjudicatory hearing upon written request within thirty (30) days following receipt of this letter. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings (6714 Mail Service Center, Raleigh, North Carolina 27699-6714). Unless such demand is made, this decision shall be final and binding.

Please note that this permit is not transferable except after notice to the Division. The Division may require modification or revocation and reissuance of the permit. This permit does not affect the legal requirements to obtain other permits which may be required by the Division of Water Resources or any other Federal, State, or Local governmental permits that may be required.

If you have any questions concerning this permit, please contact Bob Sledge at telephone number (919) 807-6398, or via e-mail at bob.sledge@ncdenr.gov.

Sincerely,



S. Jay Zimmerman, Acting Director
Division of Water Resources

cc: Central Files
Asheville Regional Office/Water Quality
NPDES File
ec: Aquatic Toxicology Branch

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES

PERMIT

TO DISCHARGE WASTEWATER UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of North Carolina General Statute 143-215.1, other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission, and the Federal Water Pollution Control Act, as amended, the

Town of Lake Lure

is hereby authorized to discharge wastewater from a facility located at the

**Lake Lure WWTP
182 Memorial Highway
Lake Lure
Rutherford County**

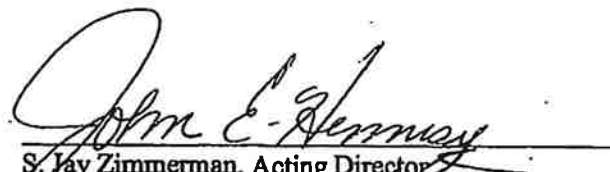
to receiving waters designated as the Broad River in the Broad River Basin

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in Parts I, II, III and IV hereof.

This permit shall become effective March 1, 2015.

This permit and authorization to discharge shall expire at midnight on August 31, 2018.

Signed this day February 10, 2015.


S. Jay Zimmerman, Acting Director
Division of Water Resources

By Authority of the Environmental Management Commission

SUPPLEMENT TO PERMIT COVER SHEET

All previous NPDES Permits issued to this facility, whether for operation or discharge are hereby revoked. As of this permit issuance, any previously issued permit bearing this number is no longer effective. Therefore, the exclusive authority to operate and discharge from this facility arises under the permit conditions, requirements, terms, and provisions included herein.

The Town of Lake Lure

is hereby authorized to:

1. Continue to operate an existing 0.995 MGD wastewater treatment facility that includes the following components:
 - Influent pump station
 - Mechanical bar screen
 - Aluminum sulfate and chlorine addition
 - Settling basin
 - Secondary clarifier
 - Chlorination equipment
 - Dechlorination
 - Sludge pumps
 - Aerobic digester

This facility is located at the Lake Lure Wastewater Treatment Plant, 182 Memorial Highway, in Lake Lure, in Rutherford County.

2. Discharge from said treatment works at the location specified on the attached map into the Broad River, currently classified C waters in the Broad River Basin.

PART I

A. (1.) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
 [15A NCAC 02B .0400 et seq., 02B .0500 et seq.]

During the period beginning on the effective date of this permit and lasting until annual average flow for a calendar year exceeds 0.445 MGD, or expiration, the Permittee is authorized to discharge from outfall 001. Such discharges shall be limited and monitored¹ by the Permittee as specified below:

EFFLUENT CHARACTERISTICS		LIMITS			MONITORING REQUIREMENTS		
Parameter Code		Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location ²
Flow	50050	0.495 MGD			Continuous	Recording	Influent & Effluent
BOD, 5-day, 20°C ⁴	CO310	30.0 mg/L	45.0 mg/L		2/Week	Composite	Effluent
Total Suspended Solids ⁴	CO530	30.0 mg/L	45.0 mg/L		2/Week	Composite	Effluent
NH ₃ as N (April 1 – October 31)	CO610	9.4 mg/L	28.2 mg/L		3/Week	Composite	Effluent
NH ₃ as N (November 1 – March 31)	CO610	Monitor & Report			3/Week	Composite	Effluent
Fecal Coliform (geometric mean)	31616	200/100 ml	400/100 ml		3/Week	Grab	Effluent
Total Residual Chlorine ³	50060			28 µg/L	2/Week	Grab	Effluent
pH	00400	≥ 6.0 and ≤ 9.0 standard units			2/Week	Grab	Effluent
Temperature (°C)	00010	Monitor & Report			2/Week	Grab	Effluent
Total Iron	01045	Monitor & Report			Weekly	Composite	Effluent
Aluminum	01105	Monitor & Report			Weekly	Composite	Effluent
Total Nitrogen (NO ₂ + NO ₃ + TKN)	CO600	Monitor & Report			Semi-annually	Composite	Effluent
Total Phosphorus	CO665	Monitor & Report			Semi-annually	Composite	Effluent
Chronic Toxicity ⁵	TGP3B	Monitor & Report			Quarterly	Composite	Effluent
Mercury (EPA Method 1631E)	COMER	Monitor & Report			1/Permit Cycle ⁶	Grab	Effluent
Flow	50050	Monitor & Report			Weekly	Recording	U ⁷
Fecal Coliform	31616	Monitor & Report			Variable ⁸	Grab	U & D
pH	00400	Monitor & Report			Variable ⁸	Grab	U & D
Temperature (°C)	00010	Monitor & Report			Variable ⁸	Grab	U & D
Dissolved Oxygen	00300	Monitor & Report			Variable ⁸	Grab	U & D

Footnotes on page 5 of this permit

A. (2.) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
 [15A NCAC 02B .0400 et seq., 02B .0500 et seq.]

During the period beginning after annual average flow for a calendar year exceeds 0.445 MGD and lasting until expiration, the Permittee is authorized to discharge from outfall 001. Such discharges shall be limited and monitored¹ by the Permittee as specified below:

PARAMETER		LIMITS			MONITORING REQUIREMENTS		
Parameter Code		Monthly Average	Weekly Average	Daily Maximum	Measurement Frequency	Sample Type	Sample Location ²
Flow	50050	0.995 MGD			Continuous	Recording	Influent & Effluent
BOD, 5-day, 20°C ⁴	CO310	30.0 mg/L	45.0 mg/L		3/Week	Composite	Effluent
Total Suspended Solids ⁴	CO530	30.0 mg/L	45.0 mg/L		3/Week	Composite	Effluent
NH ₃ as N (April 1 – October 31)	CO610	5.2 mg/L	15.6 mg/L		3/Week	Composite	Effluent
NH ₃ as N (November 1 – March 31)	CO610	Monitor & Report			3/Week	Composite	Effluent
Fecal Coliform (geometric mean)	31616	200/100 ml	400/100 ml		3/Week	Grab	Effluent
Total Residual Chlorine ³	50060			28 µg/L	3/Week	Grab	Effluent
pH	00400	≥ 6.0 and ≤ 9.0 standard units			3/Week	Grab	Effluent
Temperature (°C)	00010	Monitor & Report			3/Week	Grab	Effluent
Total Iron	01045	Monitor & Report			Weekly	Composite	Effluent
Aluminum	01105	Monitor & Report			Weekly	Composite	Effluent
Total Nitrogen (NO ₂ + NO ₃ + TKN)	CO600	Monitor & Report			Semi-annually	Composite	Effluent
Total Phosphorus	CO665	Monitor & Report			Semi-annually	Composite	Effluent
Chronic Toxicity ⁵	TGP3B	Monitor & Report			Quarterly	Composite	Effluent
Mercury (EPA Method 1631E)	COMER	Monitor & Report			1/Permit Cycle ⁶	Grab	Effluent
Flow	50050	Monitor & Report			Weekly	Recording	U ⁷
Fecal Coliform	31616	Monitor & Report			Variable ⁸	Grab	U & D
pH	00400	Monitor & Report			Variable ⁸	Grab	U & D
Temperature (°C)	00010	Monitor & Report			Variable ⁸	Grab	U & D
Dissolved Oxygen	00300	Monitor & Report			Variable ⁸	Grab	U & D

Footnotes on page 5 of this permit

Footnotes:

1. No later than December 1, 2015 (270 days from the effective date of this permit), begin submitting discharge monitoring reports electronically using NC DWR's eDMR application system. See Condition A. (6).
2. U= Upstream (50 feet from discharge point), D = Downstream (50 feet from discharge point).
3. The Division shall consider all effluent TRC values reported below 50 µg/L to be in compliance with the permit. However, the Permittee shall continue to record and submit all values reported by a North Carolina certified laboratory (including field certified), even if these values fall below 50 µg/L.
4. The monthly average effluent BOD₅ and Total Suspended Solids concentrations shall not exceed 15% of the respective influent value (85% removal).
5. Chronic Toxicity *Ceriodaphnia dubia* 7 day pass/fail testing during the months of January, April, July and October. See A. (3.) for details of toxicity test requirements.
6. Analysis must be performed using EPA Method 1631E, and must be completed within the twelve (12) months prior to the next permit renewal. See condition A. (5.).
7. See condition A. (4.).
8. Monitoring shall be conducted at a frequency of 3/Week during the months of April – October and Weekly during November through March.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

A. (3.) CHRONIC TOXICITY LIMIT (QUARTERLY)
[15A NCAC 02B .0200 et seq.]

The effluent discharge shall at no time exhibit observable inhibition of reproduction or significant mortality to *Ceriodaphnia dubia* at an effluent concentration of 10.4 % at the 0.495 MGD permitted flow level, and 19 % at the 0.995 MGD permitted flow level.

The permit holder shall perform at a minimum, *quarterly* monitoring using test procedures outlined in the "North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure," Revised December 2010, or subsequent versions or "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised- December 2010) or subsequent versions. The tests will be performed during the months of **January, April, July and October**. These months signify the first month of each three-month toxicity testing quarter assigned to the facility. Effluent sampling for this testing must be obtained during representative effluent discharge and shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

If the test procedure performed as the first test of any single quarter results in a **failure** or ChV below the permit limit, then multiple-concentration testing shall be performed at a minimum, in each of the two following months as described in "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure" (Revised-December 2010) or subsequent versions.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the months in which tests were performed, using the parameter code TGP3B for the pass/fail results and THP3B for the Chronic Value. Additionally, DWR Form AT-3 (original) is to be sent to the following address:

Attention: North Carolina Division of Water Resources
Water Sciences Section/Aquatic Toxicology Branch
1621 Mail Service Center
Raleigh, North Carolina 27699-1621

Completed Aquatic Toxicity Test Forms shall be filed with the Water Sciences Section no later than 30 days after the end of the reporting period for which the report is made.

Test data shall be complete, accurate, include all supporting chemical/physical measurements and all concentration/response data, and be certified by laboratory supervisor and ORC or approved designate signature. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should there be no discharge of flow from the facility during a month in which toxicity monitoring is required, the permittee will complete the information located at the top of the aquatic toxicity (AT) test form indicating the facility name, permit number, pipe number, county, and the month/year of the report with the notation of "No Flow" in the comment area of the form. The report shall be submitted to the Water Sciences Section at the address cited above.

A. (3.) CHRONIC TOXICITY LIMIT (QUARTERLY), continued

Should the permittee fail to monitor during a month in which toxicity monitoring is required, monitoring will be required during the following month. Assessment of toxicity compliance is based on the toxicity testing quarter, which is the three month time interval that begins on the first day of the month in which toxicity testing is required by this permit and continues until the final day of the third month.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Water Resources indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival, minimum control organism reproduction, and appropriate environmental controls, shall constitute an invalid test and will require immediate follow-up testing to be completed no later than the last day of the month following the month of the initial monitoring.

A. (4.) LAKE LURE DAM DISCHARGE
[G.S. 143-215.66]

The Town of Lake Lure controls the discharge rate of impounded water from Lake Lure. The Division has modeled the treatment plant's environmental impact based on flow parameters assuming a minimum discharge of 6.6 cfs. Therefore, as a Special Condition of this permit, the town shall record weekly (on the Upstream DMR) the Lake Lure Dam discharge to further evaluate the validity of these flow-based assumptions.

A. (5.) EFFLUENT MERCURY ANALYSIS
[15A NCAC 02B .0400 et seq., 02B .0500 et seq.]

The Permittee shall provide one effluent mercury analysis, using EPA Method 1631E, in conjunction with the next permit renewal application. The analysis should be taken within 12 months prior to the application date. Any additional effluent mercury measurements conducted from the effective date of this permit and up to the application date shall also be submitted with the renewal application.

If the result of the mercury analysis is not provided with the application, the application may be returned as incomplete and the Permittee considered non-compliant.

A. (6) ELECTRONIC REPORTING OF DISCHARGE MONITORING REPORTS
[G.S. 143-215.1(b)]

Proposed federal regulations require electronic submittal of all discharge monitoring reports (DMRs) and specify that, if a state does not establish a system to receive such submittals, then permittees must submit DMRs electronically to the Environmental Protection Agency (EPA). The Division anticipates that these regulations will be adopted and is beginning implementation in late 2013.

NOTE: This special condition supplements or supersedes the following sections within Part II of this permit (*Standard Conditions for NPDES Permits*):

- Section B. (11.) Signatory Requirements
- Section D. (2.) Reporting
- Section D. (6.) Records Retention
- Section E. (5.) Monitoring Reports

1. Reporting [Supersedes Section D. (2.) and Section E. (5.) (a)]

Beginning no later than December 1, 2015 (270 days from the effective date of this permit), the permittee shall begin reporting discharge monitoring data electronically using the NC DWR's Electronic Discharge Monitoring Report (eDMR) internet application.

Monitoring results obtained during the previous month(s) shall be summarized for each month and submitted electronically using eDMR. The eDMR system allows permitted facilities to enter monitoring data and submit DMRs electronically using the internet. Until such time that the state's eDMR application is compliant with EPA's Cross-Media Electronic Reporting Regulation (CROMERR), permittees will be required to submit all discharge monitoring data to the state electronically using eDMR and will be required to complete the eDMR submission by printing, signing, and submitting one signed original and a copy of the computer printed eDMR to the following address:

NC DENR / DWR / Information Processing Unit
 ATTENTION: Central Files / eDMR
 1617 Mail Service Center
 Raleigh, North Carolina 27699-1617

If a permittee is unable to use the eDMR system due to a demonstrated hardship or due to the facility being physically located in an area where less than 10 percent of the households have broadband access, then a temporary waiver from the NPDES electronic reporting requirements may be granted and discharge monitoring data may be submitted on paper DMR forms (MR 1, 1.1, 2, 3) or alternative forms approved by the Director. Duplicate signed copies shall be submitted to the mailing address above.

Requests for temporary waivers from the NPDES electronic reporting requirements must be submitted in writing to the Division for written approval at least sixty (60) days prior to the date the facility would be required under this permit to begin using eDMR. Temporary waivers shall be valid for twelve (12) months and shall thereupon expire. At such time, DMRs shall be submitted electronically to the Division unless the permittee re-applies for and is granted a new temporary waiver by the Division.

A. (6.) ELECTRONIC REPORTING OF DISCHARGE MONITORING REPORTS, continued

Information on eDMR and application for a temporary waiver from the NPDES electronic reporting requirements is found on the following web page:

<http://portal.ncdenr.org/web/wq/admin/bog/ipu/edmr>

Regardless of the submission method, the first DMR is due on the last day of the month following the issuance of the permit or in the case of a new facility, on the last day of the month following the commencement of discharge.

2. Signatory Requirements [Supplements Section B. (11.) (b) and supersedes Section B. (11.) (d)]

All eDMRs submitted to the permit issuing authority shall be signed by a person described in Part II, Section B. (11.) (a) or by a duly authorized representative of that person as described in Part II, Section B. (11.) (b). A person, and not a position, must be delegated signatory authority for eDMR reporting purposes.

For eDMR submissions, the person signing and submitting the DMR must obtain an eDMR user account and login credentials to access the eDMR system. For more information on North Carolina's eDMR system, registering for eDMR and obtaining an eDMR user account, please visit the following web page:

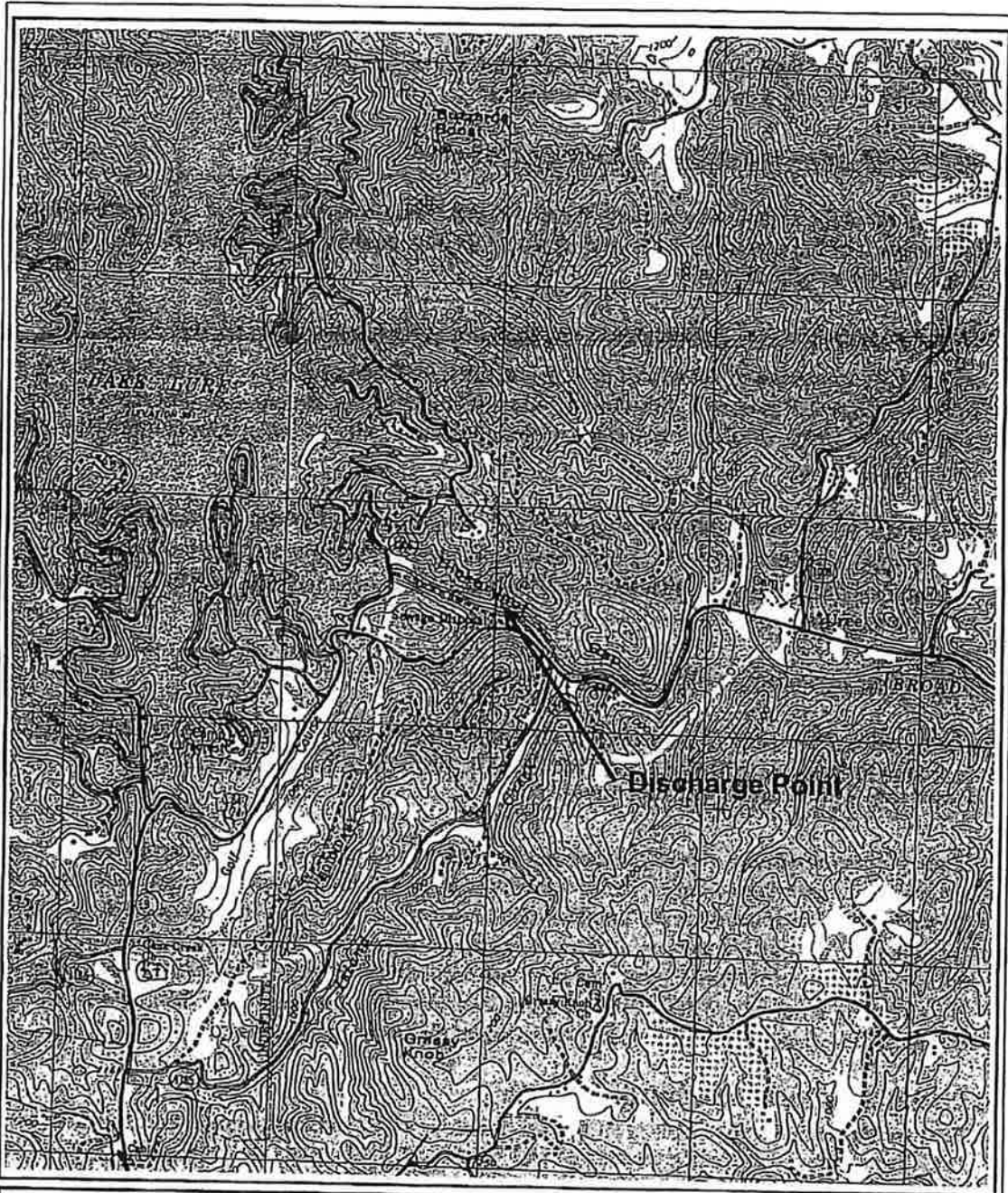
<http://portal.ncdenr.org/web/wq/admin/bog/ipu/edmr>

Certification. Any person submitting an electronic DMR using the state's eDMR system shall make the following certification [40 CFR 122.22]. NO OTHER STATEMENTS OF CERTIFICATION WILL BE ACCEPTED:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

3. Records Retention [Supplements Section D. (6.)]

The permittee shall retain records of all Discharge Monitoring Reports, including eDMR submissions. These records or copies shall be maintained for a period of at least 3 years from the date of the report. This period may be extended by request of the Director at any time [40 CFR 122.41].



**Town of Lake Lure
Lake Lure WWTP**

Latitude:	35° 25' 28" N	Site Grid:	Lake Lure
Longitude:	81° 10' 45" W	Permitted Flow:	0.995 MGD
Receiving Stream:	Broad River	Drainage Basin:	Broad River Basin
Stream Class:	C	Sub-Basin:	03-08-01



North

**Facility
Location**
not to scale



NPDES Permit NC0025381
Rutherford County

APPENDIX F

Sludge Production Ledger

Lake Lure Daily Ledger

Date	Load #	Weight Ticket #	Gross Weight	Tare Weight	Net Weight	Wet Tons	Cum. Wet Tons	% Solids	Sample No.	Dry Tons	Cum. Est. DT	Work Complete	Notes
7/30/2020	1	1211917	69,900	34,340	35,560	17.78	17.78	17.00%	203645	3.02	3.02		
8/3/2020	2	1212385	73,520	34,340	39,180	19.59	37.37	19.00%	203716	3.72	6.74	\$ 5,531.46	
8/4/2020	3	1212799	73,720	34,340	39,380	19.69	57.06	22.00%	203717	4.33	11.08	\$ 9,084.06	
8/5/2020	4	1213116	71,580	34,340	37,240	18.62	75.68	23.00%	203785	4.28	15.36	\$ 12,596.31	
8/6/2020	5	1213340	84,520	34,340	50,180	25.09	100.77	21.00%	203783	5.27	20.63	\$ 16,917.44	
8/7/2020	6	1213520	80,020	34,560	45,460	22.73	123.50	22.00%	203784	5.00	25.63	\$ 21,018.53	
8/11/2020	7	1214059	80,600	34,340	46,260	23.13	146.63	22.00%	203784	5.09	30.72	\$ 25,191.79	
8/18/2020	8	1215201	71,180	34,340	36,840	18.42	165.05	23.00%		2.12	32.84	\$ 26,929.05	Dry tons reduced by 1/2, the other half for geo tube CO.

APPENDIX G

Wastewater Treatment Plant (Plant) Photos



Fine Screen installed incorrectly allows solids to bypass the screen



Flash Mix installed below the hundred year flood elevation



Flocculation Basin installed below hundred year flood elevation and Shows signs of acid attack



Sedimentation Basin with heavy solids deposition due to P/C Process and non-functioning digester



Sedimentation Basin installed below the hundred year flood elevation, the water depth is 4' shallower than the design documents, the walls are 6" thick and likely have only one 1 level of reinforcement.



WAS pump station installed below hundred year flood elevation



Digester is structurally deficient, is not able to be completely filled, cannot decant, or safely aerate.



Secondary Clarifier is only 8' deep and SOR is above recommended value and installed below the hundred year flood elevation



Secondary Clarifier full scum box with heavy solids that bypass the fine screen



Chlorine Contact Chamber installed below hundred year flood Elevation and in need of rehabilitation



Influent Pump Station routinely overwhelmed by lake infiltration

APPENDIX H

Future Peaking Factor
Lake Lure Flow Projections without
completion of the proposed project
Seasonal Peaking Factor

Future Peaking Factor (20 year)

Local Government Unit Name: Town of Lake Lure
Project Name: Subaqueous Sewer System Replacement

FOR USE WITH GLS

Peaking Factor Calculations

PF = $3.5Qa^{0.807}$ where Qa = Flow in MGD

Future Flow	Peaking Factor
0.18	0.9

Use minimum PF = 2.5*

*The peaking factor will be 2.5 after completion of the entire project in 2034.

Future Peaking Factor (20 year)

Local Government Unit Name: Town of Lake Lure
Project Name: Subaqueous Sewer System Replacement

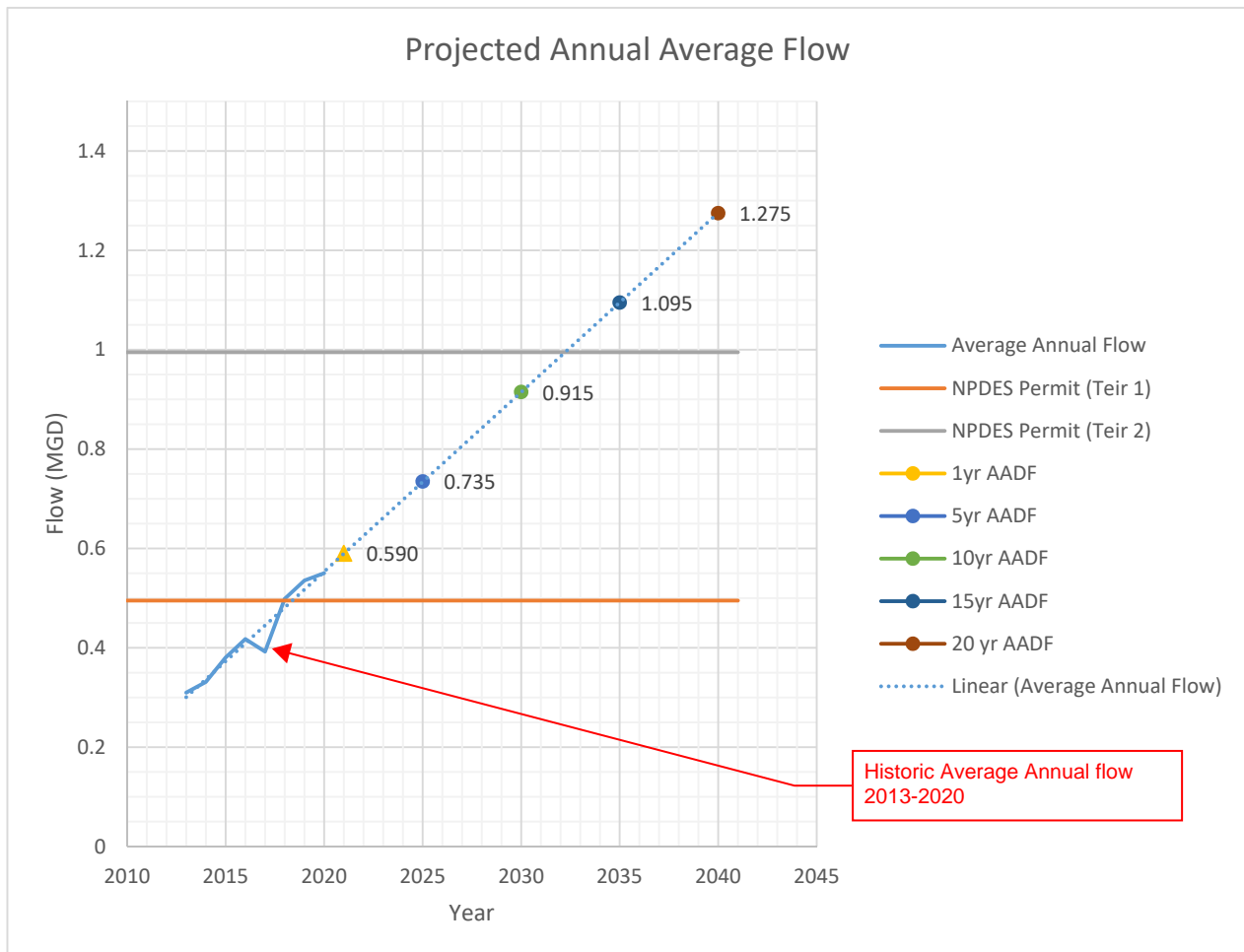
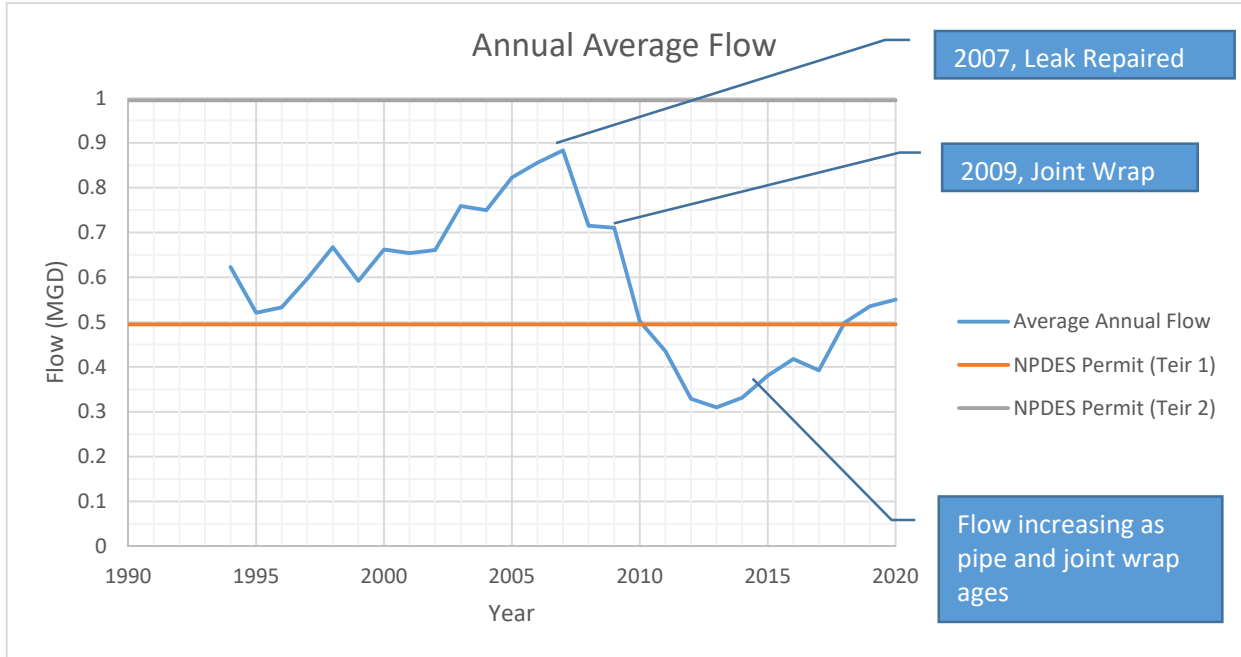
FOR USE WITH WWTP

Peaking Factor Calculations

$$PF = \frac{18 + (P^{0.5})}{4 + (P^{0.5})} \quad \text{where } P = \text{population in thousands}$$

Future Population	Peaking Factor
10,209	2.9

Lake Lure Flow Projections without Project



Seasonal Variation Flow Analysis
 Subaqueous Sewer System Replacement
 Town of Lake Lure

Current			
Average Daily Flow (gpd)			162,050
Min MADF (gpd)	SPF	0.72	116,028
Max MADF (gpd)	SPF	1.25	202,418
20 Yr Projected			
Average Daily Flow (gpd)			183,612
Min MADF (gpd)	SPF	0.72	131,467
Max MADF (gpd)	SPF	1.25	229,351
Peaking Factor*			2.5
Peak Flow (gpd)			459,030
Min Seasonal Pk Flow (gpd)	SPF	0.72	328,667
Max Seasonal Pk Flow (gpd)	SPF	1.25	573,378

*The Peaking Factor will be 2.5 after 2034

APPENDIX I

US Census Data

- Current Population
- Population Projections

POPULATION DENSITY

per the NC Office of State Budget and Management (OSBM)

AREA NAME	AREA TYPE	VARIABLE	YEAR	VALUE	DATA TYPE
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2018	92	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2017	91	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2016	91	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2015	90	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2014	83	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2013	90	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2012	90	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2011	90	Estimate
Lake Lure	Municipality	Population Density (Persons Per Square Mile)	2010	89	Count

Municipal Population By County 2010-2019

County	Municipality	Year	Population
Rutherford	Chimney Rock	April 1, 2010	113
Rutherford	Lake Lure	April 1, 2010	1192
Rutherford	Chimney Rock	July 1, 2010	113
Rutherford	Lake Lure	July 1, 2010	1185
Rutherford	Chimney Rock	July 1, 2011	114
Rutherford	Lake Lure	July 1, 2011	1202
Rutherford	Chimney Rock	July 1, 2012	113
Rutherford	Lake Lure	July 1, 2012	1198
Rutherford	Chimney Rock	July 1, 2013	112
Rutherford	Lake Lure	July 1, 2013	1199
Rutherford	Chimney Rock	July 1, 2014	111
Rutherford	Lake Lure	July 1, 2014	1199
Rutherford	Chimney Rock	July 1, 2015	111
Rutherford	Lake Lure	July 1, 2015	1205
Rutherford	Chimney Rock	July 1, 2016	111
Rutherford	Lake Lure	July 1, 2016	1207
Rutherford	Chimney Rock	July 1, 2017	112
Rutherford	Lake Lure	July 1, 2017	1218
Rutherford	Chimney Rock	July 1, 2018	112
Rutherford	Lake Lure	July 1, 2018	1226
Rutherford	Chimney Rock	July 1, 2019	112
Rutherford	Lake Lure	July 1, 2019	1235

Annual County Population Totals, 2010-2019

County	Estimates										Projections	
	July 2010	July 2011	July 2012	July 2013	July 2014	July 2015	July 2016	July 2017	July 2018	July 2019	July 2018	July 2019
Rutherford	67,737	67,928	67,920	67,705	67,545	67,627	67,679	68,279	68,423	68,908		
STATE	9,574,293	9,656,754	9,749,123	9,843,599	9,933,944	10,033,079	10,156,679	10,270,800	10,389,148	10,508,254		

Source: North Carolina OSBM, Standard Population Estimates, Vintage 2018 and Population Projections, Vintage 2019

Projected Annual County Population Totals, 2020-2029

County	Estimates										Projections	
	July 2020	July 2021	July 2022	July 2023	July 2024	July 2025	July 2026	July 2027	July 2028	July 2029	July 2028	July 2029
Rutherford	69,105	69,432	69,759	70,088	70,415	70,744	71,071	71,398	71,725	72,051		
STATE	10,630,691	10,753,496	10,873,632	10,992,997	11,112,320	11,233,133	11,354,621	11,476,074	11,596,521	11,716,353		

Source: North Carolina OSBM, Standard Population Estimates, Vintage 2018 and Population Projections, Vintage 2019

Projected Annual County Population Totals, 2030-2039

County	Estimates										Projections	
	July 2030	July 2031	July 2032	July 2033	July 2034	July 2035	July 2036	July 2037	July 2038	July 2039	July 2038	July 2039
Rutherford	72,379	72,707	73,033	73,363	73,687	74,015	74,344	74,669	74,998	75,326		
STATE	11,836,070	11,956,318	12,077,047	12,198,006	12,318,790	12,439,269	12,559,449	12,679,534	12,799,658	12,919,921		

Source: North Carolina OSBM, Standard Population Estimates, Vintage 2018 and Population Projections, Vintage 2019

APPENDIX J

Environmental Information Document
Supporting Information and Comment
Letters



Endangered Species, Threatened Species, and Candidate Species, Rutherford County, North Carolina



Updated: 07-17-2020

Common Name	Scientific name	Federal Status	Record Status
Vertebrate:			
Bald eagle	<i>Haliaeetus leucocephalus</i>	BGPA	Current
Bog turtle	<i>Glyptemys muhlenbergii</i>	T (S/A)	Current
Eastern small-footed bat	<i>Myotis leibii</i>	ARS	Current
Green salamander	<i>Aneides aeneus</i>	ARS	Current
Indiana bat	<i>Myotis sodalis</i>	E	Current
Northern long-eared bat	<i>Myotis septentrionalis</i>	T	Current
Invertebrate:			
Vascular Plant:			
Carolina Hemlock	<i>Tsuga caroliniana</i>	ARS	Current
Dwarf-flowered heartleaf	<i>Hexastylis naniflora</i>	T	Current
Small whorled pogonia	<i>Isotria medeoloides</i>	T	Current
White irisette	<i>Sisyrinchium dichotomum</i>	E	Current
Nonvascular Plant:			
Appalachian Pocket Moss	<i>Fissidens appalachensis</i>	ARS	Current
Lichen:			
Rock gnome lichen	<i>Gymnoderma lineare</i>	E	Current

Definitions of Federal Status Codes:

E = endangered. A taxon "in danger of extinction throughout all or a significant portion of its range."

T = threatened. A taxon "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

C = candidate. A taxon under consideration for official listing for which there is sufficient information to support listing. (Formerly "C1" candidate species.)

BGPA = Bald and Golden Eagle Protection Act. See below.

ARS = [At Risk Species](#). Species that are Petitioned, Candidates or Proposed for Listing under the Endangered Species Act. Consultation under Section 7(a)(2) of the ESA is not required for Candidate or Proposed species; although a Conference, as described under Section 7(a)(4) of the ESA is recommended for actions affecting species proposed for listing.

T(S/A) = threatened due to similarity of appearance. A taxon that is threatened due to similarity of appearance with another listed species and is listed for its protection. Taxa listed as T(S/A) are not biologically endangered or threatened and are not subject to Section 7 consultation. See below.

EXP = experimental population. A taxon listed as experimental (either essential or nonessential). Experimental, nonessential populations of endangered species (e.g., red wolf) are treated as threatened species on public land, for consultation purposes, and as species proposed for listing on private land.

P = proposed. Taxa proposed for official listing as endangered or threatened will be noted as "PE" or "PT", respectively.

Bald and Golden Eagle Protection Act (BGPA):

In the July 9, 2007 Federal Register(72:37346-37372), the bald eagle was declared recovered, and removed (delisted) from the Federal List of Threatened and Endangered wildlife. This delisting took effect August 8,2007.

After delisting, the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668-668d) becomes the primary law protecting bald eagles. The Eagle Act prohibits take of bald and golden eagles and provides a statutory definition of "take" that includes "disturb". The USFWS has developed National Bald Eagle Management Guidelines to provide guidance to land managers, landowners, and others as to how to avoid disturbing bald eagles. For mor information, visit <http://www.fws.gov/migratorybirds/baldeagle.htm>

Threatened due to similarity of appearance(T(S/A)):

In the November 4, 1997 Federal Register (55822-55825), the northern population of the bog turtle (from New York south to Maryland) was listed as T (threatened), and the southern population (from Virginia south to Georgia) was listed as T(S/A) (threatened due to similarity of appearance). The T(S/A) designation bans the collection and interstate and international commercial trade of bog turtles from the southern population. The T(S/A) designation has no effect on land management activities by private landowners in North Carolina, part of the southern population of the species. In addition to its official status as T(S/A), the U.S. Fish and Wildlife Service considers the southern population of the bog turtle as a Federal species of concern due to habitat loss.

Definitions of Record Status:

Current - Based on NC Natural Heritage Program information, this taxon is considered to be extant in the county.

Historical - Based on NC Natural Heritage Program information, this taxon is considered to be historical in the county, meaning that all recorded occurrences are either extirpated, have not been found in recent surveys, or have not been surveyed recently enough to be confident they are still present.

Obscure - the date and/or location of observation is uncertain.

Incidental/migrant - the species was observed outside of its normal range or habitat.

Probable/potential - the species is considered likely to occur in this county based on the proximity of known records (in adjacent counties), the presence of potentially suitable habitat, or both.

Species	Suitable Habitat	Impact Avoidance/Minimization Measures
<p>Bald eagle (<i>Haliaeetus leucocephalus</i>)</p>	<p>Bald eagle habitat includes estuaries, large lakes, reservoirs, rivers, and some seacoasts. In winter, the birds congregate near open water in tall trees for spotting prey and night roosts for sheltering.</p> <p>Bald eagles generally nest near coastlines, rivers, and large lakes where there is an adequate food supply. They nest in mature or old-growth trees, snags (dead trees), cliffs, and rock promontories. Nest sites typically include at least one perch with a clear view of the water, where they forage. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Bald eagle nests are generally 4-5 feet wide and 2-4 feet deep, although the nesting pair will add nesting material to the nest every year.</p>	<p>If any active nests are detected within a half mile of the project site, we request that work at the site be restricted from mid-January through July in order to prevent adverse impacts to the bald eagle. This will prevent disturbance of the eagles from the egg laying period until the young fledge, which encompasses their most vulnerable times.</p>
<p>Dwarf-flowered heartleaf (<i>Hexastylis naniflora</i>)</p>	<p>Dwarf-flowered heartleaf typically grows in acidic soils along bluffs and adjacent slopes, in boggy areas next to streams and creek heads, and along the slopes of nearby hillsides and ravines.</p>	<p>Avoid direct/indirect impacts to suitable habitat. Survey for the presence of this species during the appropriate survey window.¹ Members of the genus <i>Hexastylis</i> can be identified any time of year using characteristic evergreen leaves, but flowers are required to diagnose this species.</p>
<p>Indiana bat (<i>Myotis sodalis</i>)</p>	<p>Potential winter habitat/hibernacula for Indiana bats include caves (and their associated sinkholes, fissures, and other karst features), rockshelters, underground quarries, and abandoned mine portals (and their associated underground workings).</p> <p>Suitable summer habitat for Indiana bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed nonforested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches diameter at breast height (dbh)² (12.7 centimeters (cm)) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of another forested/wooded habitat.</p>	<p>Avoid direct/indirect impacts to suitable habitat. Avoid tree clearing activities during the active season for this species: April 1 – October 15. Survey for the presence of this species following Range-wide survey guidelines for Indiana bat²</p>

¹ Survey windows for federally listed plants that occur in North Carolina can be found here: <https://www.fws.gov/asheville/pdfs/Optimal%20Survey%20Windows%20for%20listed%20plants%202020.pdf>

² Range-wide survey guidelines for Indiana bat can be found here: <https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/FINAL%20Range-wide%20IBat%20Survey%20Guidelines%203.23.20.pdf>

<p>Northern long-eared bat (<i>Myotis septentrionalis</i>)</p>	<p>Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, like barns and sheds.</p>	<p>Avoid direct/indirect impacts to suitable habitat. Avoid tree clearing activities during the active season for this species: April 1 – October 15. Survey for the presence of this species following Range-wide survey guidelines for Indiana bat²</p>
<p>Rock gnome lichen (<i>Gynmoderma lineare</i>)</p>	<p>Rock gnome lichen is primarily limited to vertical rock faces where seepage water from forest soils above flows at (and only at) very wet times. It appears the species needs a moderate amount of light, but that it cannot tolerate high-intensity solar radiation. It does well on moist, generally open, sites, with northern exposures, but needs at least partial canopy coverage where the aspect is southern or western.</p>	<p>Avoid direct/indirect impacts to suitable habitat. Survey for the presence of this species during the appropriate survey window.¹</p>
<p>Small-whorled pogonia (<i>Isotria medeoloides</i>)</p>	<p>This orchid grows in older hardwood stands of beech, birch, maple, oak, and hickory that have an open understory. Sometimes it grows in stands of softwoods such as hemlock. It prefers acidic soils with a thick layer of dead leaves, often on slopes near small streams.</p>	<p>Avoid direct/indirect impacts to suitable habitat. Survey for the presence of this species during the appropriate survey window.¹</p>
<p>White irisette (<i>Sisyrinchium dichotomum</i>)</p>	<p>The species is found on mid-elevation slopes, characterized by open, dry-to-moderate-moisture oak-hickory forests. White irisette usually grows in shallow soils on regularly disturbed sites (such as woodland edges and roadsides) and over rocky, steep terrain.</p>	<p>Avoid direct/indirect impacts to suitable habitat. Survey for the presence of this species during the appropriate survey window.¹</p>



**North Carolina Department of Natural and Cultural Resources
State Historic Preservation Office**

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

December 11, 2020

MEMORANDUM

TO: Susan Kubacki susan.kubacki@ncdenr.gov
Division of Water Infrastructure
NC Department of Environmental Quality

FROM: Ramona M. Bartos, Deputy State Historic Preservation Officer *RMB for Ramona M. Bartos*

SUBJECT: Lake Lure Subaqueous Sanitary Sewer Replacement (previously: Lake Lure Green Line Sewer Interconnection, Lake Lure to Spindale), Rutherford County, ER 16-2351

Thank you for your email of November 2, 2020, regarding the above-referenced project. We have reviewed the submission and offer the following comments. We apologize for the delay in our response and any inconvenience it may have caused.

The project as proposed will have no adverse effect on the National Register-eligible Lake Lure Dam and Hydroelectric Plant (RF0605).

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.



NORTH CAROLINA
Environmental Quality

ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

MEMORANDUM

To: Susan Kubacki
Environmental Assessment Coordinator
Division of Water Infrastructure
Environmental and Special Projects Unit

From: Lyn Hardison
Division of Environmental Assistance and Customer Service
Environmental Assistance and Project Review Coordinator
Washington Regional Office

Re: Environmental Review/Engineering Report
Lake Lure Sanitary Sewer Replacement Project - Proposal to replace Lake Lure's existing sewer collection system and continue using their own wastewater treatment plant. DEQ#1791 REV
Rutherford County

Date: March 31, 2021

The Department of Environmental Quality has completed the review of the proposal referenced project. Please refer to NC Wildlife Resource Commission comments and take their concerns and recommendations into consideration.

We appreciate the opportunity to respond during the the Department's internal review.

Thank you for the opportunity to respond.

Attachments



North Carolina Department of Environmental Quality
217 West Jones Street | 1601 Mail Service Center | Raleigh, North Carolina 27699-1601
919.707.8600

Department of Environmental Quality Project Review Form

Project Number: DEQ #1791 County: Rutherford
Revised

Date Received: 3-9-2021

Due Date: 3-30-2021

Project Description: REVISED Environmental Review/Engineering Report - Town of Lake Lure's Subaqueous Sanitary Sewer Replacement Project

This Project is being reviewed as indicated below:

Regional Office	Regional Office Area	In-House Review	
<input checked="" type="checkbox"/> Asheville	<input type="checkbox"/> Air	<input type="checkbox"/> Air Quality	<input type="checkbox"/> Coastal Management
<input type="checkbox"/> Fayetteville	<input checked="" type="checkbox"/> DWR	<input type="checkbox"/> Parks & Recreation	<input type="checkbox"/> Marine Fisheries
<input type="checkbox"/> Mooresville	<input checked="" type="checkbox"/> DWR - Public Water	<input type="checkbox"/> Waste Mgmt	<input type="checkbox"/> Military Affairs
<input type="checkbox"/> Raleigh	<input type="checkbox"/> DEMLR (LQ & SW)	<input checked="" type="checkbox"/> Water Resources Mgmt (Public Water, Planning & Water Quality Program)	<input type="checkbox"/> DMF-Shellfish Sanitation
<input type="checkbox"/> Washington	<input type="checkbox"/> DWM-UST	<input type="checkbox"/> DWR-Transportation Unit	<input checked="" type="checkbox"/> Wildlife <u>Andrea Leslie</u>
<input type="checkbox"/> Wilmington			<input type="checkbox"/> Wildlife - DOT
<input type="checkbox"/> Winston-Salem			

Manager Sign-Off/Region:	Date: 3/30/2021	In-House Reviewer/Agency: A Leslie/NCWRC
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Response (check all applicable)

- No objection to project as proposed. No Comment
 Insufficient information to complete review Other (specify or attach comments)

Revised report did not address concerns and recommendations noted on first draft. Therefore, our earlier comments still apply

If you have any questions, please contact:

Lyn Hardison at lyn.hardison@ncdenr.gov or (252) 948-3842
943 Washington Square Mall Washington NC 27889
Courier No. 16-04-01



◊ North Carolina Wildlife Resources Commission ◊

Cameron Ingram, Executive Director

MEMORANDUM

TO: Lyn Hardison, Environmental Assistance and SEPA Coordinator
NCDENR Division of Environmental Assistance and Customer Services

FROM: Andrea Leslie, Mountain Region Coordinator
Habitat Conservation *Andrea Leslie*

DATE: 21 October 2020

SUBJECT: Engineering Report for Lake Lure Subaqueous Sanitary Sewer Replacement
DEQ Project No. 1791

Biologists with the North Carolina Wildlife Resources Commission have reviewed the Engineering Report for the Lake Lure Subaqueous Sanitary Sewer Replacement, and we are familiar with the habitat values of the area. Our comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e) and the North Carolina General Statutes (G.S. 113-131 et seq.).

The report proposes to address chronic issues with infiltration and inflow (I&I) and wastewater treatment plant (WWTP) inadequacies, which have resulted in numerous NPDES permit violations. Both the sanitary sewer collection system and the WWTP are operating under pending Special Order of Consent. The report proposes the following:

- During the first phase of work, the subaqueous sanitary sewer system (SASS) would be replaced with gravity flowing sewers that would be placed upland and parallel to more than 19 miles of lake shoreline. Currently, the I&I from the lake into the SASS contributes the majority of flow to the WWTP.
- The second phase of work would involve retrofitting the WWTP, which has been operating as a physical-chemical plant due to the high volume of wastewater delivered by the SASS. This plant is incapable of treating ammonia, and it has had chronic problems meeting its permit limits for flow, total suspended solids, and ammonia. As the first phase would address the majority of I&I issues and the excessive flows sent to the WWTP, the WWTP would be rehabilitated into a biological treatment system. The Engineering Report proposes to address the following components: step screen, grit removal system, influent pump station, process train, clarifier, digesters, and chlorine

contact chamber. It is our understanding that the WWTP design is still under development.

There is an excellent Smallmouth Bass fishery downstream of the lake in the Broad River. However, native mussels and other native fish species are highly impacted below the dam and the WWTP, and the community starts to recover more than 4 miles downstream. Even in this recovery area, NCWRC biologists have documented recent mussel die-offs. NC Division of Water Resources biologists have also documented a highly impacted (Fair) benthic macroinvertebrate community in the Broad River over several decades, and this section of river is on the 303(d) list due to biological impairment.

We support the rehabilitation to the sewer collection system and the WWTP, as these actions should address chronic issues with ammonia, TSS, and sanitary sewer overflows. We recommend that the WWTP design take into consideration possible impacts to water quality resulting from ammonia, pharmaceutical and personal care products (PPCP)/endocrine disrupting compounds (EDC), chlorine, and treatment plant upsets. In order to address these concerns, we recommend considering the following:

- Include measures (e.g., flow equalization and offline storage) to ensure consistent effluent water quality and downstream protection from overflows. The WWTP should provide a minimum of five days of storage for untreated or undertreated wastewater. We are concerned about impacts to water quality, aquatic habitat, and aquatic species should treatment upsets occur particularly during low flow periods (e.g., 7Q10 or less). The Environmental Assessment (EA) should include a description of the measures that will be used to store untreated or undertreated wastewater, as well as measures used to ensure consistent effluent water quality and downstream protection from overflows.
- Develop site-specific acute and chronic water quality standards for ammonia, using the 2013 USEPA's *Aquatic Life Ambient Water Quality Criteria for Ammonia-Freshwater*.
- Studies have shown PPCP and EDC in municipal effluent can cause adverse physiological effects to fish and freshwater mussels (Bouchard et al. 2009, Bringolf et al. 2010, Farcy et al. 2011, Gagné et al. 2011a, Gagné et al. 2011b, Liney et al. 2011, and Vajda et al. 2001). The WWTP should be designed with technology that is known to reduce or eliminate PPCPs and EDCs from wastewater. Some measures that appear to provide effective reduction or elimination of these emerging contaminants include membrane bioreactors, granular activated carbon, powdered activated carbon, ozonation, and combinations of these treatment technologies. The EA should provide a discussion on emerging contaminants, particularly PPCPs and EDCs, and the treatment measures that will be used in the WWTP to reduce or eliminate these from the effluent.
- Incorporate a disinfection system using ultraviolet light or ozone instead of chlorine. Chlorine is acutely toxic to aquatic organisms and can form secondary compounds that are detrimental to aquatic life.

Chronic problems with wastewater treatment an obvious stressor impacting the Broad River. However, the Broad River is subject to extreme fluctuations in flow due to operations at the near 100-year old hydropower dam on Lake Lure. Concurrent with the sewer collection system and WWTP project are plans to retrofit of the 100-year old hydropower dam. In order to restore water and habitat quality in the Broad River, we recommend that this retrofit incorporate changes

to the flow regime (e.g., increasing minimum flows and modifying flow surges) and possible modifications in outflow temperature to more closely mimic temperatures of streams that feed the lake. These changes in dam operation are likely more important than the WWTP treatment recommendations noted above to restore the Broad River, allowing its native fish and mussel community to rebound and supporting a dependable and enjoyable boating and angling experience.

Thank you for the opportunity to review and comment on this project. Please contact me at (828) 400-4223 if there are any questions about these comments.

Literature cited:

Bouchard, B., F. Gagné, M. Fortier, and M Fournier. 2009. An in-situ study of the impacts of urban wastewater on the immune and reproductive systems of the freshwater mussel *Elliptio complanata*. *Comparative Biochemistry and Physiology Part C: Toxicology and Pharmacology* 150(2):132-140.

Bringolf, R.B., R.M. Heltsley, J.T. Newton, C.B Eads, S.J. Fraley, D. Shea, W.G. Cope. 2010. Environmental occurrence and reproductive effects of the pharmaceutical fluoxetine in native freshwater mussels. *Environmental Toxicology and Chemistry* 29(6):1311-1318.

Farcy, E., F. Gagné, L Martel, M. Fortier, S. Trépanier, P. Brousseau, M. Fournier. 2011. Short-term physiological effects of a xenobiotic mixture on the freshwater mussel *Elliptio complanata* exposed to municipal effluents. *Environmental Research* 111(8):1096-1106.

Gagné F., C André, P. Cejka, R. Hausler, and M Fournier. 2011a. Evidence of neuroendocrine disruption in freshwater mussels exposed to municipal wastewaters. *Science of the Total Environment* 409(19):3711-3718.

Gagné F., C André, P. Cejka, R. Hausler, and M Fournier. 2011b. Alterations in DNA metabolism in *Elliptio complanata* mussels after exposure to municipal effluents. *Comparative Biochemistry and Physiology Part C: Toxicology and Pharmacology* 154(2):100-107.

Liney, K.E. J.A. Hagger, C.R. Tyler, M.H. Depledge, T.S. Galloway, and S. Jobling. 2011. Health effects in fish of long-term exposure to effluents from wastewater treatment works. *Environmental Health Perspectives*, April, 114 (Suppl 1): 81-89.

ec: Landon Davidson, NCDWR
Byron Hamstead, US Fish and Wildlife Service
Chris Goudreau, TR Russ, and Chris Wood, NCWRC

ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

S. DANIEL SMITH
Director



NORTH CAROLINA
Environmental Quality

March 22, 2021

MEMORANDUM

To: Lyn Hardison
Department of Environmental Quality

From: David Wainwright *DW*
SEPA Coordinator, Division of Water Resources

Subject: Project #1791 (Revised)
Engineering Report
Subaqueous Sanitary Sewer Replacement/Wastewater Collection Systems
Improvements
Rutherford County

The Division of Water Resources' (DWR) Central Office staff have reviewed the revised Engineering Report for the proposed Subaqueous Sanitary Sewer Replacement project for the Town of Lake Lure. The proposed project will replace Lake Lure's existing sewer collection system and continue using their own wastewater treatment plant. Based on the proposed project revisions, staff provide the following updated comments:

Municipal Permitting Unit (Christyn Fertenbaugh – Christyn.Fertenbaugh@ncdenr.gov or 919-707-3625):

- Sewer extension permit(s) will be necessary for the construction and operation of the new sewer lines as well as for any modifications to existing lines. These sewer permits will need to proceed through the full technical review due to the design aspects listed in the proposal, including the review and approval of alternative designs.
 - As described in the documents, specialty design considerations are necessary for the encroachment of the sewers on Lake Lure and related water bodies as well as for the proposed unique alternatives.
- An Authorization to Construct will be necessary for any proposed alternations to the existing treatment plant.
- Updates to the current NPDES discharge permit may be necessary at permit renewal, based on the currently proposed changes to the treatment plant. Changes in capacity or overall treatment design/process will require permit revision prior to making the changes.

The Division of Water Resources, Central Office, thanks you for the opportunity to comment. Should you have questions regarding any of the above comments, please contact the listed staff. I can be reached at either David.Wainwright@ncdenr.gov or 919-707-9045.

ec: Christyn Fertenbaugh, Municipal Permitting Unit



North Carolina Department of Environmental Quality | Division of Water Resources
512 North Salisbury Street | 1611 Mail Service Center | Raleigh, North Carolina 27699-1611
919.707.9000

State of North Carolina Department of Environmental Quality
 INTERGOVERNMENTAL REVIEW PROJECT COMMENTS

Reviewing Regional Office: Asheville
 Project Number: DEQ#-1791 Due Date: 03/30/2021
 County: Rutherford

After review of this project it has been determined that the DEQ permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of the form. All applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
<input checked="" type="checkbox"/>	Permit to construct & operate wastewater treatment facilities, non-standard sewer system extensions & sewer systems that do not discharge into state surface waters.	Application 90 days before begins construction or award of construction contracts. On-site inspection may be required. Post-application technical conference usual.	30 days (90 days)
<input checked="" type="checkbox"/>	Permit to construct & operate, sewer extensions involving gravity sewers, pump stations and force mains discharging into a sewer collection system	Fast-Track Permitting program consists of the submittal of an application and an engineer's certification that the project meets all applicable State rules and Division Minimum Design Criteria.	30 days (N/A)
<input type="checkbox"/>	NPDES - permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.	Application 180 days before begins activity. On-site inspection. Pre-application conference usual. Additionally, obtain permit to construct wastewater treatment facility-granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit-whichever is later.	90-120 days (N/A)
<input type="checkbox"/>	Water Use Permit	Pre-application technical conference usually necessary.	30 days (N/A)
<input type="checkbox"/>	Well Construction Permit	Complete application must be received and permit issued prior to the installation of a groundwater monitoring well located on property not owned by the applicant, and for a large capacity (>100,000 gallons per day) water supply well.	7 days (15 days)
<input type="checkbox"/>	Dredge and Fill Permit	Application copy must be served on each adjacent riparian property owner. On-site inspection. Pre-application conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.	55 days (90 days)
<input type="checkbox"/>	Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.O100 thru 2Q.0300)	Application must be submitted and permit received prior to construction and operation of the source. If a permit is required in an area without local zoning, then there are additional requirements and timelines (2Q.0113).	90 days
<input type="checkbox"/>	Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900	N/A	60 days (90 days)
<input type="checkbox"/>	Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 20.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-707-5950	Please Note - The Health Hazards Control Unit (HHCU) of the N.C. Department of Health and Human Services, must be notified of plans to demolish a building, including residences for commercial or industrial expansion, even if no asbestos is present in the building.	60 days (90 days)
<input type="checkbox"/>	The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres are to be disturbed. Plan must be filed with and approved by applicable Regional Office (Land Quality Section) at least 30 days before beginning activity. A NPDES Construction Stormwater permit (NCG010000) is also usually issued should design features meet minimum requirements. A fee of \$65 for the first acre or any part of an acre. An express review option is available with additional fees.		20 days (30 days)
<input type="checkbox"/>	Sedimentation and erosion control must be addressed in accordance with NCDOT's approved program. Particular attention should be given to design and installation of appropriate perimeter sediment trapping devices as well as stable Stormwater conveyances and outlets.		(30 days)
<input type="checkbox"/>	Sedimentation and erosion control must be addressed in accordance with _____ Local Government's approved program. Particular attention should be given to design and installation of appropriate perimeter sediment trapping devices as well as stable Stormwater conveyances and outlets.		Based on Local Program
<input type="checkbox"/>	Compliance with 15A NCAC 2H .0126 - NPDES Stormwater Program which regulates three types of activities: Industrial, Municipal Separate Storm Sewer System & Construction activities that disturb ≥1 acre.		30-60 days (90 days)
<input type="checkbox"/>	Compliance with 15A NCAC 2H 1000 -State Stormwater Permitting Programs regulate site development and post-construction stormwater runoff control. Areas subject to these permit programs include all 20 coastal counties, and various other counties and watersheds throughout the state.		45 days (90 days)

State of North Carolina Department of Environmental Quality
 INTERGOVERNMENTAL REVIEW PROJECT COMMENTS

Reviewing Regional Office: Asheville
 Project Number: DEQ#-1791 Due Date: 03/30/2021
 County: Rutherford

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
<input type="checkbox"/>	Mining Permit	On-site inspection usual. Surety bond filed with DEQ Bond amount varies with type mine and number of acres of affected land. Affected area greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.	30 days (60 days)
<input type="checkbox"/>	Dam Safety Permit	If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to: prepare plans, inspect construction, and certify construction is according to DEQ approved plans. May also require a permit under mosquito control program. And a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of \$200.00 must accompany the application. An additional processing fee based on a percentage or the total project cost will be required upon completion.	30 days (60 days)
<input type="checkbox"/>	Oil Refining Facilities	N/A	90-120 days (N/A)
<input type="checkbox"/>	Permit to drill exploratory oil or gas well	File surety bond of \$5,000 with DEQ running to State of NC conditional that any well opened by drill operator shall, upon abandonment, be plugged according to DEQ rules and regulations.	10 days N/A
<input type="checkbox"/>	Geophysical Exploration Permit	Application filed with DEQ at least 10 days prior to issue of permit. Application by letter. No standard application form.	10 days N/A
<input type="checkbox"/>	State Lakes Construction Permit	Application fee based on structure size is charged. Must include descriptions & drawings of structure & proof of ownership of riparian property	15-20 days N/A
<input checked="" type="checkbox"/>	401 Water Quality Certification	Compliance with the T15A 02H .0500 Certifications are required whenever construction or operation of facilities will result in a discharge into navigable water as described in 33 CFR part 323.	60 days (130 days)
<input type="checkbox"/>	Compliance with Catawba, Goose Creek, Jordan Lake, Randleman, Tar Pamlico or Neuse Riparian Buffer Rules is required. Buffer requirements: http://deq.nc.gov/about/divisions/water-resources/water-resources-permits/wastewater-branch/401-wetlands-buffer-permits/401-riparian-buffer-protection-program		
<input type="checkbox"/>	Nutrient Offset: Loading requirements for nitrogen and phosphorus in the Neuse and Tar-Pamlico River basins, and in the Jordan and Falls Lake watersheds, as part of the nutrient-management strategies in these areas. DWR nutrient offset information: http://deq.nc.gov/about/divisions/water-resources/planning/nonpoint-source-management/nutrient-offset-information		
<input type="checkbox"/>	CAMA Permit for MAJOR development	\$250.00 - \$475.00 fee must accompany application	75 days (150 days)
<input type="checkbox"/>	CAMA Permit for MINOR development	\$100.00 fee must accompany application	22 days (25 days)
<input type="checkbox"/>	Abandonment of any wells, if required must be in accordance with Title 15A. Subchapter 2C.0100.		
<input type="checkbox"/>	Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.		
<input type="checkbox"/>	Plans and specifications for the construction, expansion, or alteration of a public water system must be approved by the Division of Water Resources/Public Water Supply Section prior to the award of a contract or the initiation of construction as per 15A NCAC 18C .0300 et. seq., Plans and specifications should be submitted to 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. All public water supply systems must comply with state and federal drinking water monitoring requirements. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days
<input checked="" type="checkbox"/>	If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Water Resources/Public Water Supply Section at 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days
<input type="checkbox"/>	Plans and specifications for the construction, expansion, or alteration of the _____ water system must be approved through the _____ delegated plan approval authority. Please contact them at _____ for further information.		

State of North Carolina Department of Environmental Quality
 INTERGOVERNMENTAL REVIEW PROJECT COMMENTS

Reviewing Regional Office: Asheville
 Project Number: DEQ#-1791 Due Date: 03/30/2021
 County: Rutherford

Other Comments (attach additional pages as necessary, being certain to comment authority)

Division	Initials	No comment	Comments	Date Review
DAQ		<input type="checkbox"/>		/ /
DWR-WQROS	GLD	<input type="checkbox"/>	Project workd in the backshore will likely require an Individual 401 Water Quality Certification. Contact Amy Annino at 828-296-4500 for additional information. Construction BMPs and sound erosion control measures shall be utilized to avoid discharging sediment laden water to streams and wetlands, which may result in a water quality violation. Please contact Tim Heim regarding sewer permitting. Please contact the USACE first for determination of permitting, the contact is Brandee Boggs Brandee.C.Boggs@usace.army.mil 828-271-7980 x4224. The ARO WQROS is aware of this project and working closely with the permit holder. A trout buffer variance may be necessary (see DEMLR).	3/15/2021
DWR-PWS	MG	<input type="checkbox"/>	If existing water mains of a public water system will be relocated during the project, plans for water line relocation must be submitted to the Division of Water Resources/Public Water Supply Section.	3/16/21
DEMLR (LQ & SW)		<input type="checkbox"/>		/ /
DWM – UST		<input type="checkbox"/>		/ /
Other Comments		<input type="checkbox"/>		/ /

REGIONAL OFFICES

Questions regarding these permits should be addressed to the Regional Office marked below.

- | | | |
|---|---|--|
| <input type="checkbox"/> Asheville Regional Office
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211
Phone: 828-296-4500
Fax: 828-299-7043 | <input type="checkbox"/> Fayetteville Regional Office
225 Green Street, Suite 714,
Fayetteville, NC 28301-5043
Phone: 910-433-3300
Fax: 910-486-0707 | <input type="checkbox"/> Mooreville Regional Office
610 East Center Avenue, Suite 301,
Mooreville, NC 28115
Phone: 704-663-1699
Fax: 704-663-6040 |
| <input type="checkbox"/> Raleigh Regional Office
3800 Barrett Drive,
Raleigh, NC 27609
Phone: 919-791-4200
Fax: 919-571-4718 | <input type="checkbox"/> Washington Regional Office
943 Washington Square Mall,
Washington, NC 27889
Phone: 252-946-6481
Fax: 252-975-3716 | <input type="checkbox"/> Wilmington Regional Office
127 Cardinal Drive Ext.,
Wilmington, NC 28405
Phone: 910-796-7215
Fax: 910-350-2004 |
| | <input type="checkbox"/> Winston-Salem Regional Office
450 Hanes Mill Road, Suite 300,
Winston-Salem, NC 27105
Phone: 336-776-9800
Fax: 336-776-9797 | |

APPENDIX K

Subaqueous Sewer System Design Information

The determination of current capacity design must be explained in order to understand how future capacity design was determined. The current capacity design is based on the LOT COUNTS that are adjacent to the alignment (waterfront), and the number of non-waterfront lots that currently flow through conventional landside gravity sewers to the existing subaqueous sewers. This latter category includes flows from Rumbling Bald Resort and Chimney Rock Village and in these cases, measured or recorded flow values were used to estimate their contributions. Everything was then converted to Equivalent Residential Connections (ERCs) using 400 GPD/ERC for flow. This conversion results in Chimney Rock Village contributing approximately 90 ERCs (from flow monitoring data and includes a substantial amount of I&I) which corresponds to about 36,000 GPD and Rumbling Bald Resort contributing approximately 120 ERCs.

There are a few locations where landside manholes along the north or south shorelines discharge into the subaqueous system and these account for approximately 70 landside lots. There are also approximately 738 water-fronting parcels, each of which are treated as an ERC.

The total ERCs then is 1,018, which equates to approximately 408,000 gpd, using a 400 gpd ERC value.

It should be noted again that all of the components being constructed as part of this project are new, replacing the existing parallel components that will eventually be abandoned.

The proposed gravity sanitary sewer system will be two “parallel” systems – a North Shoreline system, and a South Shoreline system. These don’t come together until they meet at the dam and penetrate the dam through a single pipe. The South Shoreline system collects flow from Chimney Rock Village and everything east of Chimney Rock Village that meets the south shoreline. These account for approximately 450 ERCs collected before penetrating the dam which equates to approximately 180,000 gpd.

The North Shoreline system collects everything along the north shoreline, including Rumbling Bald. This accounts for approximately 570 ERCs collected before penetrating the dam, which is approximately 228,000 gpd.

As flows are collected along each of the two shoreline systems, the peak flow of the accumulated collected flows will drive the sizing of the sewers, which will in turn drive the minimum required pipe slopes, which will in turn drive depth of the gravity sewers.

Wherever gravity sewer depth reaches an elevation 20-feet below the normal lake water surface, a lift station will be installed to raise flows to the highest possible elevation to simply raise the flow to the downstream gravity sanitary sewer segment that leaves the lift station (taking into account minimum depth of the sewer under the backshore floor to prevent flotation and provide pipe protection). The gravity system will then continue until the next 20 foot depth again requires a lift station. This sequence will be repeated until the pipe reaches the dam and penetrates it, after which it will flow by gravity (bypassing the existing WWTP influent pump station) to the WWTP.

Lift station locations are conceptual, but approximately 15 are anticipated, with more along the North Shoreline system than along the South Shoreline system (since the North Shoreline is considerably longer). The specific capacity of each station will depend on how many ERCs are able to be collected prior to the critical (20-foot) sewer depth, as well as the specific routing configuration of the mains (e.g., whether dedicated branches can be extended into some coves, rather than routing main flows into and out of these coves sequentially). According to the conceptual routing, required lift station capacities would vary from a low of 22 ERCs (8,800 gpd

average, peaked to 53 gpm) to a high of 286 ERCs (114,400 gpd average, peaked to 423 gpm). However, for the sake of uniformity of equipment, pump stations with capacity requirements less than 250 gpm will be fitted with pumps that lift approximately 250 gpm, which will also ensure regular flushing of the mains regardless of low contributing flows. Larger lift stations will be fitted with pumps that lift approximately 425 gpm, for the same reasons.

All Tops 992.50 Q/capita 100 gpd
 N-value 0.011 Q/ERC 400 gpd
 C-value 130 Max HGL 990.50

Gravity / Lift Stations System Design Model

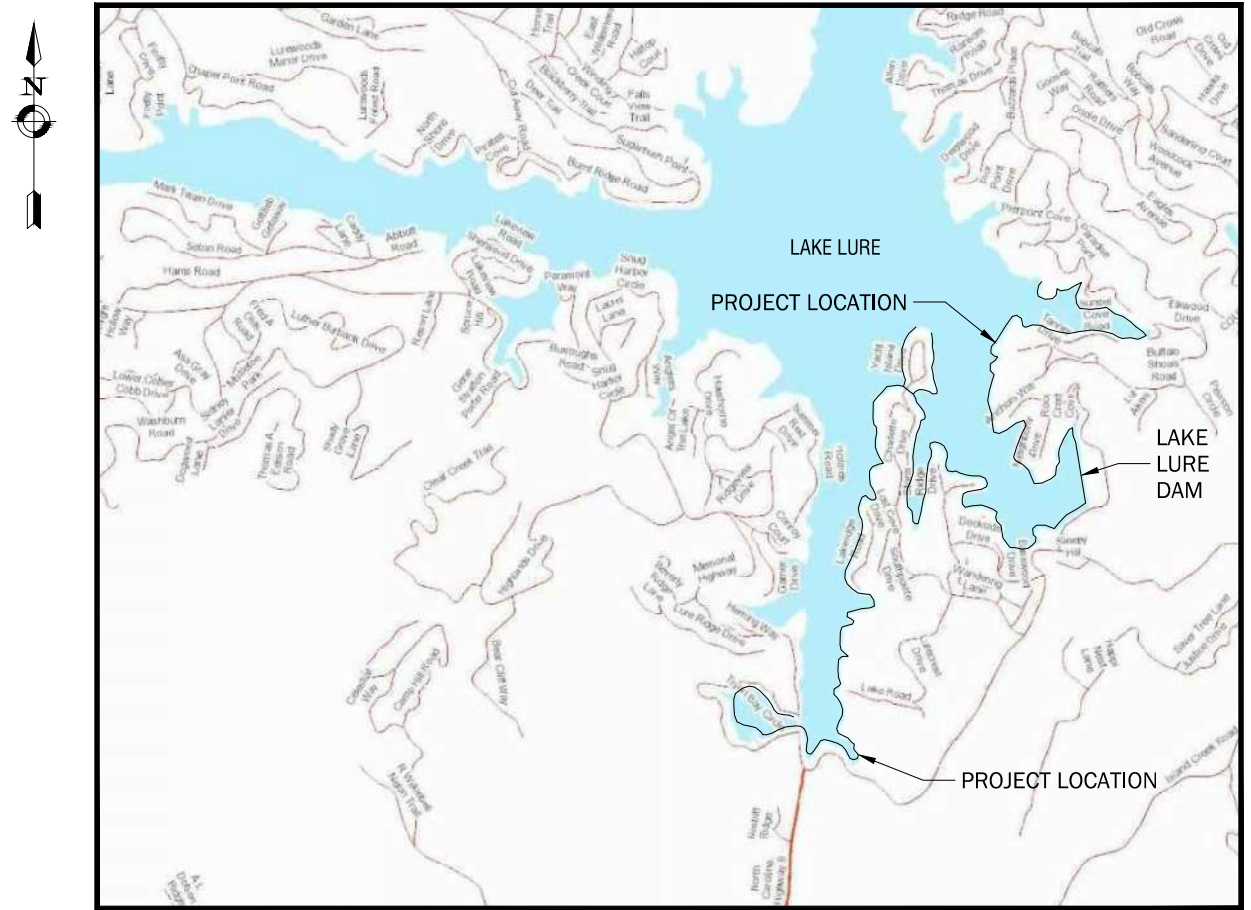
Manholes				Incoming Flows						Downstream Gravity Sewer								Capacity Ratios				
Shore-line MH#	Inv In	Station	MH Depth	ERCs			Flowrates (gpm)			Grav Out	Pipe Dia	Slope %	Capacity (gpm)		Vel @ Flows (fps)		Length (ft)	Fall (ft)	(+ Service Conn's	DS MH#	Avg Ratio	Peak Ratio
				Phase 1	Future Phases	Accum. Total	Avg	3.5Q _a ^{0.807} Peak	DEQ Peak				Peak (full)	Average (half full)	Peak	Average						
North Shoreline Alignment (Phase 1)																						
N111	n/a	82+74	9.05	0	507	507	141	671	504	983.45	16"	0.14%	1525	762	2.36	1.52	623	0.87	5	N110	5.4	2.3
N110	982.58	76+51	10.02	5	0	512	142	676	509	982.48	16"	0.14%	1526	763	2.36	1.53	772	1.08	5	N109	5.4	2.3
N109	981.40	68+79	11.20	10	0	517	144	681	513	981.30	16"	0.14%	1528	764	2.37	1.53	428	0.60	3	N108	5.3	2.2
N108	980.70	64+51	11.90	13	0	520	144	685	516	980.60	16"	0.14%	1535	767	2.38	1.54	926	1.31	10	N107	5.3	2.2
N107	979.29	55+25	13.31	23	0	530	147	695	525	979.19	16"	0.14%	1532	766	2.39	1.55	951	1.34	5	N106	5.2	2.2
N106	977.85	45+74	14.75	28	0	535	149	700	529	977.75	16"	0.14%	1526	763	2.38	1.55	872	1.22	4	N105	5.1	2.2
N105	976.53	37+02	16.07	32	0	539	150	705	533	976.43	16"	0.14%	1524	762	2.38	1.55	774	1.08	5	N104	5.1	2.2
N104	975.35	29+28	17.25	37	0	544	151	710	538	975.25	16"	0.15%	1556	778	2.43	1.57	110	0.16	1	N103	5.1	2.2
N103	975.09	28+18	17.51	38	0	545	151	711	538	974.99	16"	0.14%	1521	760	2.39	1.55	943	1.31	7	N102	5.0	2.1
N102	973.68	18+75	18.92	45	0	552	153	718	545	973.58	16"	0.14%	1521	760	2.39	1.56	828	1.15	12	N101	5.0	2.1
N101	972.43	10+47	20.17	57	0	564	157	731	555	972.33	16"	0.14%	1529	765	2.41	1.57	947	1.33	4	S101	4.9	2.1
S101	971.00	1+00	21.60	61	0	568	158	735	559	970.90												
South Shoreline Alignment (Phase 1)																						
S121	n/a	77+31	9.62	0	35	35	10	78	41	982.88	8"	0.40%	407	203	2.00	1.08	992	3.97	15	S120	20.9	5.2
S120	978.91	67+39	13.69	15	0	50	14	103	58	978.81	8"	0.40%	407	203	2.17	1.21	945	3.79	12	S119	14.6	3.9
S119	975.02	57+94	17.58	27	0	62	17	123	71	974.92	8"	0.40%	407	203	2.28	1.29	978	3.92	3	S118	11.8	3.3
S118	971.00	48+16	21.50	30	0	65	18	128	74		6"					840	0	1	S117	2.8 (Pumped)		
S117	987.02	39+76	5.58	31	0	66	18	129	75	986.92	8"	0.40%	407	204	2.31	1.31	977	3.92	1	S116	11.1	3.1
S116	983.00	29+99	9.60	32	0	67	19	131	76	982.90	8"	0.40%	404	202	2.30	1.31	182	0.72	0	S115	10.9	3.1
S115	982.18	28+17	10.42	32	0	67	19	131	76	982.08	8"	0.40%	407	203	2.31	1.32	963	3.86	1	S114	10.9	3.1
S114	978.22	18+54	14.38	33	0	68	19	133	77	978.12	8"	0.40%	407	204	2.32	1.32	842	3.38	6	S113	10.8	3.1
S113	974.74	10+12	17.86	39	0	74	21	142	84	974.64	8"	0.40%	406	203	2.36	1.36	912	3.64	8	S112	9.9	2.9
S112	971.00	88+27	21.50	47	0	82	23	154	93		6"					797	0	5	S111	2.3 (Pumped)		
S111	987.00	80+30	5.60	52	0	87	24	162	98	986.90	8"	0.40%	407	203	2.45	1.42	957	3.83	7	S110	8.4	2.5
S110	983.07	70+73	9.53	67	283	385	107	537	393	982.97	14"	0.17%	1184	592	2.41	1.53	163	0.28	0	S109	5.5	2.2
S109	982.69	69+10	9.91	74	0	392	109	545	399	982.59	14"	0.17%	1173	586	2.40	1.53	784	1.32	8	S108	5.4	2.2
S108	981.27	61+26	11.33	82	0	400	111	554	407	981.17	14"	0.17%	1177	588	2.42	1.54	944	1.6	15	S107	5.3	2.1
S107	979.57	51+82	13.03	97	0	415	115	571	420	979.47	14"	0.17%	1181	591	2.44	1.56	784	1.34	6	S106	5.1	2.1
S106	978.13	43+98	14.47	103	0	421	117	577	426	978.03	14"	0.17%	1170	585	2.43	1.56	823	1.38	2	S105	5.0	2.0
S105	976.65	35+75	15.95	105	0	423	118	579	428	976.55	14"	0.17%	1181	590	2.45	1.57	773	1.32	2	S104	5.0	2.0
S104	975.23	28+02	17.37	107	0	425	118	582	430	975.13	16"	0.14%	1518	759	2.26	1.44	881	1.22	8	S103	6.4	2.6
S103	973.91	19+21	18.69	115	0	433	120	590	437	973.81	16"	0.14%	1528	764	2.28	1.45	963	1.35	13	S102	6.4	2.6
S102	972.46	9+58	20.14	128	0	446	124	605	449	972.36	16"	0.14%	1541	770	2.31	1.47	954	1.36	1	S101	6.2	2.5
S101	971.00	0+04	21.60	129	0	447	124	606	450	970.90	16"					n/a	n/a	0	n/a			
S302	n/a	11+92	5.33	0	0	0	0	0	0	987.17	8"	0.40%	406	203	0.00	0.00	960	3.84	7	S301		
S301	983.33	2+32	9.27	7	0	7	2	21	8	983.23	8"	0.41%	411	205	1.38	0.67	132	0.54	0	S109	105.7	19.4
S401	n/a	8+56	6.40	0	0	0	0	0	0	986.10	8"	0.40%	407	203	0.00	0.00	756	3.03	8	S110		

All Tops 992.50 Q/capita 100 gpd
 N-value 0.011 Q/ERC 400 gpd
 C-value 130 Max HGL 990.50

Gravity / Lift Stations System Design Model

<u>Manholes</u>				<u>Lift Station & Force Main</u>							<u>Failure Analysis (based on DEQ peaks)</u>						
Shore-line MH#	Inv In	Station	MH Depth	Lift Station?	Inv Out	FM Flow Rate (GPM)	Pump Rate (GPM)	FM Velocity	FM HL	Max Allowed FM HGL	Notes	BW Due to FM	Q @ Pipe End (GPM)	GS hL	MH Peak HGL	FrBd	Successive failures - Peak HGL
North Shoreline Alignment (Phase 1)																	
N111	n/a	82+74	9.05								End Phase 1 - North Alignment						
N110	982.58	76+51	10.02														
N109	981.40	68+79	11.20														
N108	980.70	64+51	11.90														
N107	979.29	55+25	13.31														
N106	977.85	45+74	14.75														
N105	976.53	37+02	16.07														
N104	975.35	29+28	17.25														
N103	975.09	28+18	17.51														
N102	973.68	18+75	18.92														
N101	972.43	10+47	20.17														
S101	971.00	1+00	21.60														
South Shoreline Alignment (Phase 1)																	
S121	n/a	77+31	9.62								End Phase 1 - N of Tryon Bay		58	0.09	987.90	4.60	989.30
S120	978.91	67+39	13.69										71	0.13	987.80	4.70	989.21
S119	975.02	57+94	17.58										74	0.15	987.67	4.83	989.08
S118	971.00	48+16	21.50	Y	987.02	210	226	2.38	3.48	990.50		0.51			987.53	4.97	988.93
S117	987.02	39+76	5.58										76	0.15	988.43	4.07	988.43
S116	983.00	29+99	9.60										76	0.03	988.27	4.23	988.27
S115	982.18	28+17	10.42										77	0.16	988.24	4.26	988.24
S114	978.22	18+54	14.38										84	0.16	988.09	4.41	988.09
S113	974.74	10+12	17.86										93	0.20	987.93	4.57	987.93
S112	971.00	88+27	21.50	Y	987.00	217	226	2.46	3.50	990.50		0.73			987.73	4.77	987.73
S111	987.00	80+30	5.60														
S110	983.07	70+73	9.53														
S109	982.69	69+10	9.91														
S108	981.27	61+26	11.33														
S107	979.57	51+82	13.03														
S106	978.13	43+98	14.47														
S105	976.65	35+75	15.95														
S104	975.23	28+02	17.37														
S103	973.91	19+21	18.69														
S102	972.46	9+58	20.14														
S101	971.00	0+04	21.60								Thru Dam to WWTP						
S302	n/a	11+92	5.33								Dead End - East Side Yacht Island						
S301	983.33	2+32	9.27														
S401	n/a	8+56	6.40								Dead End - West Side Yacht Island						

SUBAQUEOUS SANITARY SEWER REPLACEMENT GRAVITY-LIFT STATION SYSTEM - PHASE I LAKE LURE, NC



LOCATION MAP
N.T.S.

DRAWINGS ARE PRINTED AT A
REDUCED SCALE FOR THIS REPORT
DRAWINGS ARE NOT TO SCALE

TOWN OF LAKE LURE
2948 MEMORIAL HIGHWAY
PO BOX 225
LAKE LURE, NC 28746
PROJECT NO: 2200559
JAN. 2021



ISSUED FOR REVIEW JAN. 2021
TOWN OF LAKE LURE PROJECT NO: 2200559
SUBAQUEOUS SANITARY SEWER REPLACEMENT GRAVITY-LIFT STATION SYSTEM - PHASE I 2948 MEMORIAL HIGHWAY, PO BOX 225, LAKE LURE, NC 28746

**DRAWINGS ARE PRINTED AT A
REDUCED SCALE FOR THIS REPORT
DRAWINGS ARE NOT TO SCALE**

SHEET INDEX

- C000 COVER SHEET
- C001 SHEET INDEX AND SHEET LAYOUT

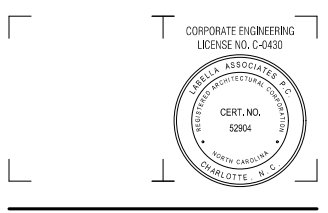
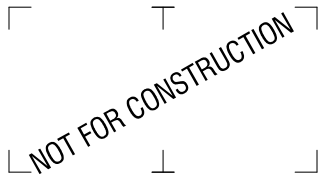
- C101 SOUTH ALIGNMENT 1 STA 0+00 TO STA 11+00
- C102 SOUTH ALIGNMENT 1 STA 11+00 TO STA 22+00
- C103 SOUTH ALIGNMENT 1 STA 22+00 TO STA 33+00
- C104 SOUTH ALIGNMENT 1 STA 33+00 TO STA 44+00
- C105 SOUTH ALIGNMENT 1 STA 44+00 TO STA 55+00
- C106 SOUTH ALIGNMENT 1 STA 55+00 TO STA 66+00
- C107 SOUTH ALIGNMENT 1 STA 66+00 TO STA 77+00
- C108 SOUTH ALIGNMENT 1 STA 77+00 TO STA 88+27

- C201 SOUTH ALIGNMENT 2 STA 1+00 TO STA 12+00
- C202 SOUTH ALIGNMENT 2 STA 12+00 TO STA 23+00
- C203 SOUTH ALIGNMENT 2 STA 23+00 TO STA 34+00
- C204 SOUTH ALIGNMENT 2 STA 34+00 TO STA 45+00
- C205 SOUTH ALIGNMENT 2 STA 45+00 TO STA 56+00
- C206 SOUTH ALIGNMENT 2 STA 56+00 TO STA 67+00
- C207 SOUTH ALIGNMENT 2 STA 67+00 TO STA 77+32

SHEET INDEX

- C301 SOUTH ALIGNMENT 3 STA 1+00 TO STA 11+92
- C401 SOUTH ALIGNMENT 4 STA 1+00 TO STA 8+56

- C501 NORTH ALIGNMENT 1 STA 1+00 TO STA 12+00
- C502 NORTH ALIGNMENT 1 STA 12+00 TO STA 23+00
- C503 NORTH ALIGNMENT 1 STA 23+00 TO STA 34+00
- C504 NORTH ALIGNMENT 1 STA 34+00 TO STA 45+00
- C505 NORTH ALIGNMENT 1 STA 45+00 TO STA 56+00
- C506 NORTH ALIGNMENT 1 STA 56+00 TO STA 67+00
- C507 NORTH ALIGNMENT 1 STA 67+00 TO STA 78+00
- C508 NORTH ALIGNMENT 1 STA 78+00 TO STA 82+74



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Lake Lure, NC 28746



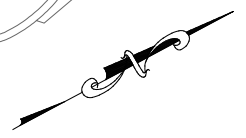
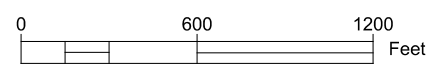
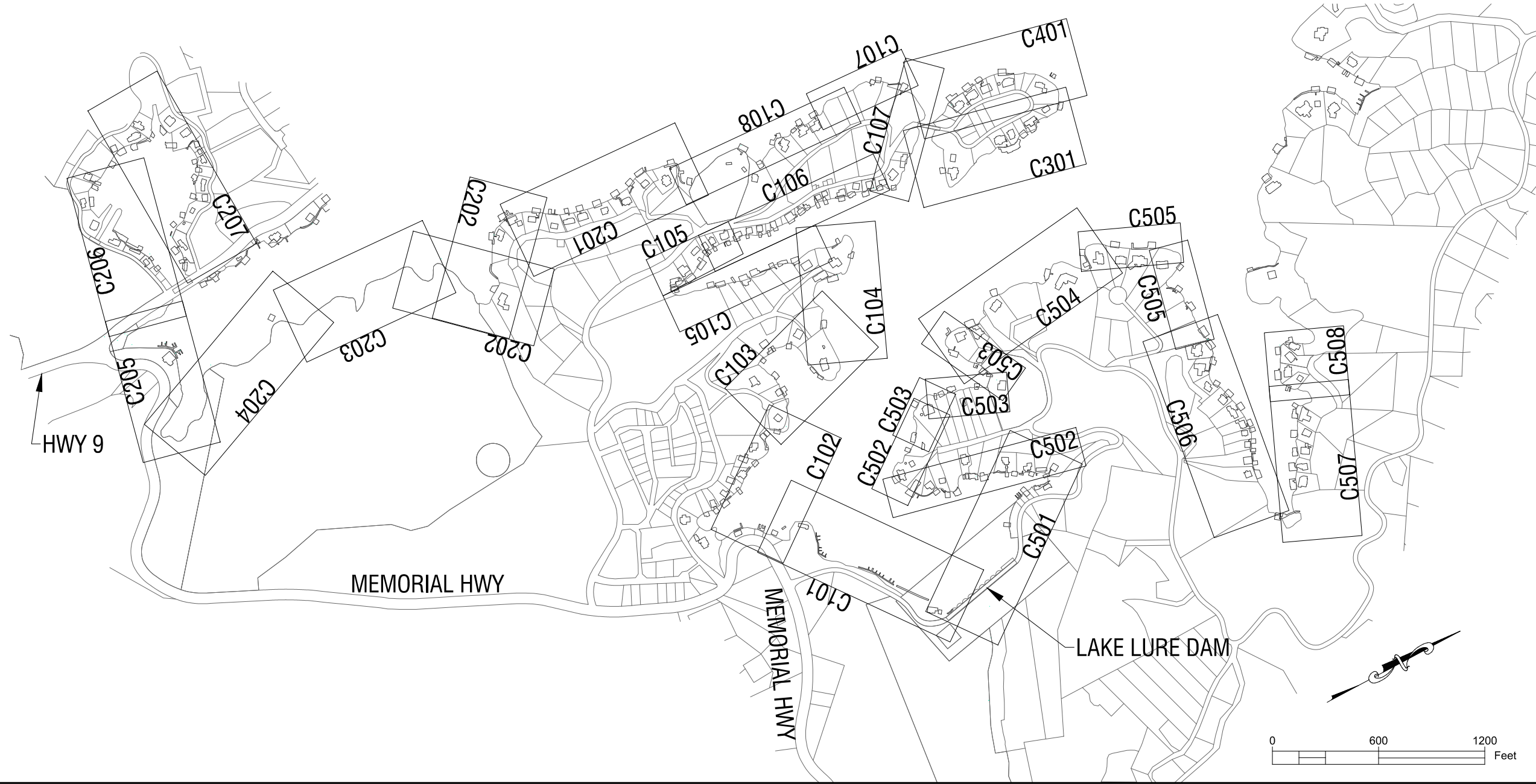
**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

**SHEET INDEX &
SHEET LAYOUT**

DRAWING NUMBER:

C001



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2948 Memorial Highway
PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

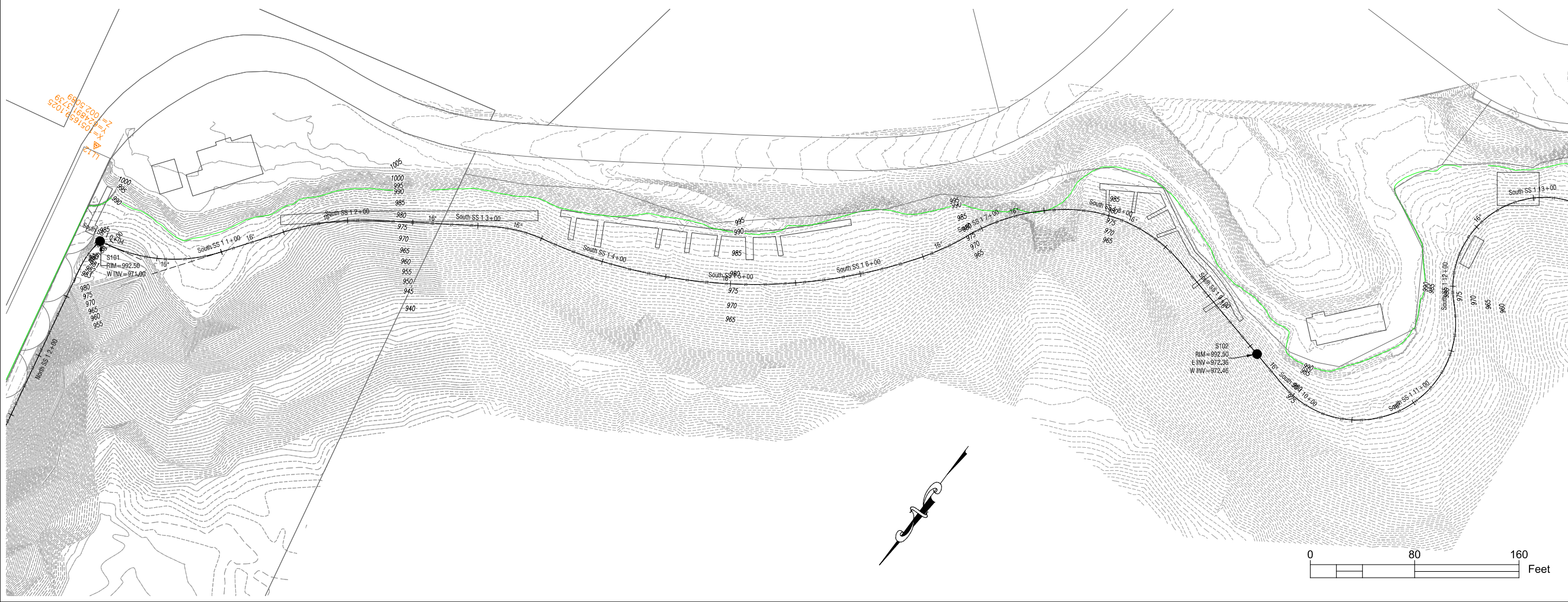
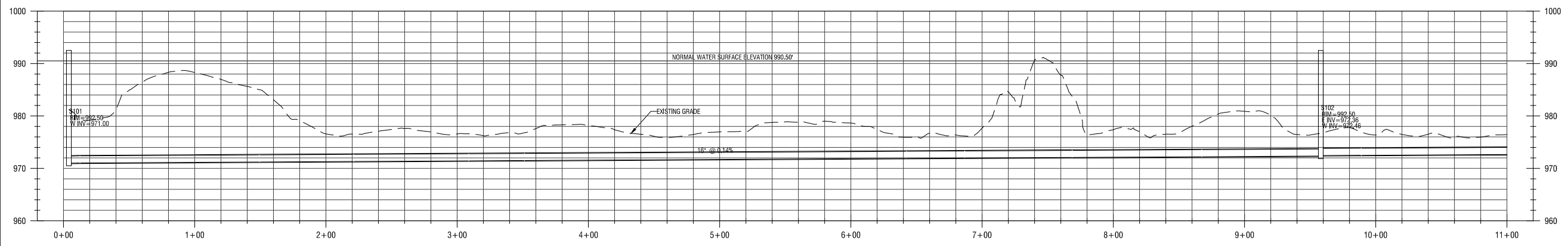
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STA 0+00 TO STA 11+00**

DRAWING NUMBER:

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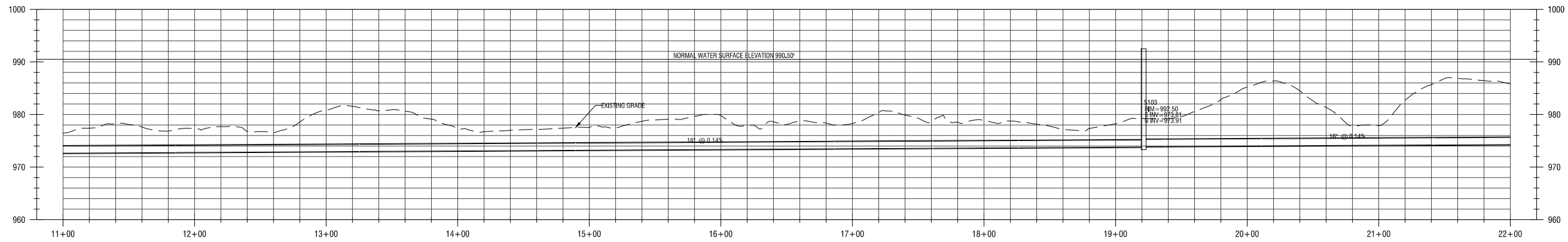
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REDUCED SCALE FOR THIS REPORT
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Profile View of South SS 1

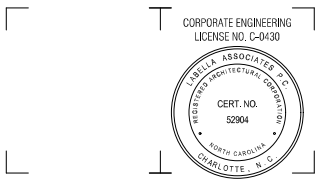


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Profile View of South SS 1



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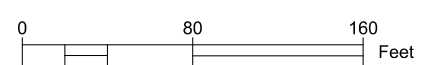
Town of Lake Lure
2948 Memorial Highway
PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
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REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
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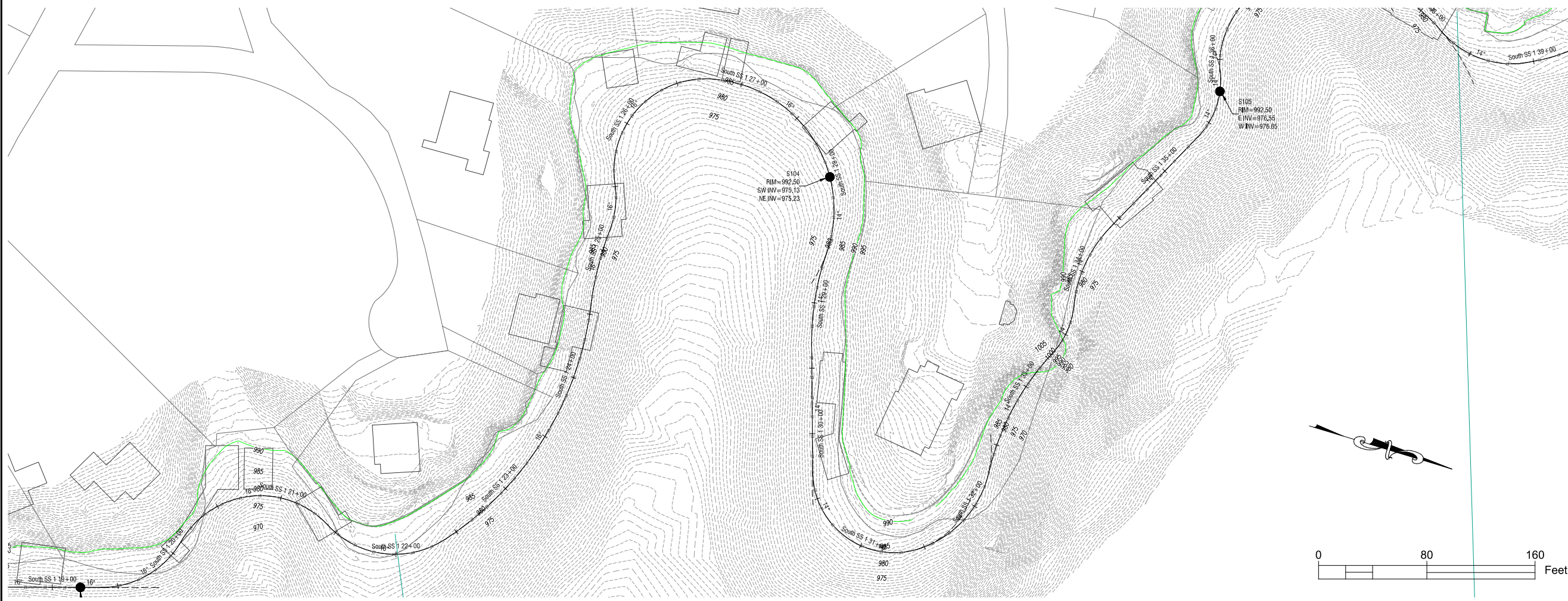
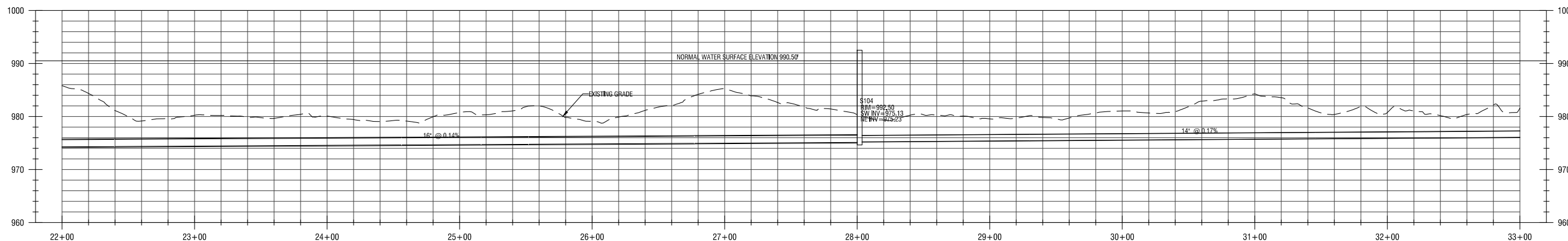
**SOUTH ALIGNMENT 1
STA 11+00 TO STA 22+00**



DRAWING NUMBER:
C102

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CORPORATE ENGINEERING
LICENSE NO. C-0430



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Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
Revisions		

PROJECT NUMBER: 2200559

DRAWN BY: JSB

REVIEWED BY: BRH

ISSUED FOR: ISSUED FOR

DATE: Jan, 2021

DRAWING NAME:

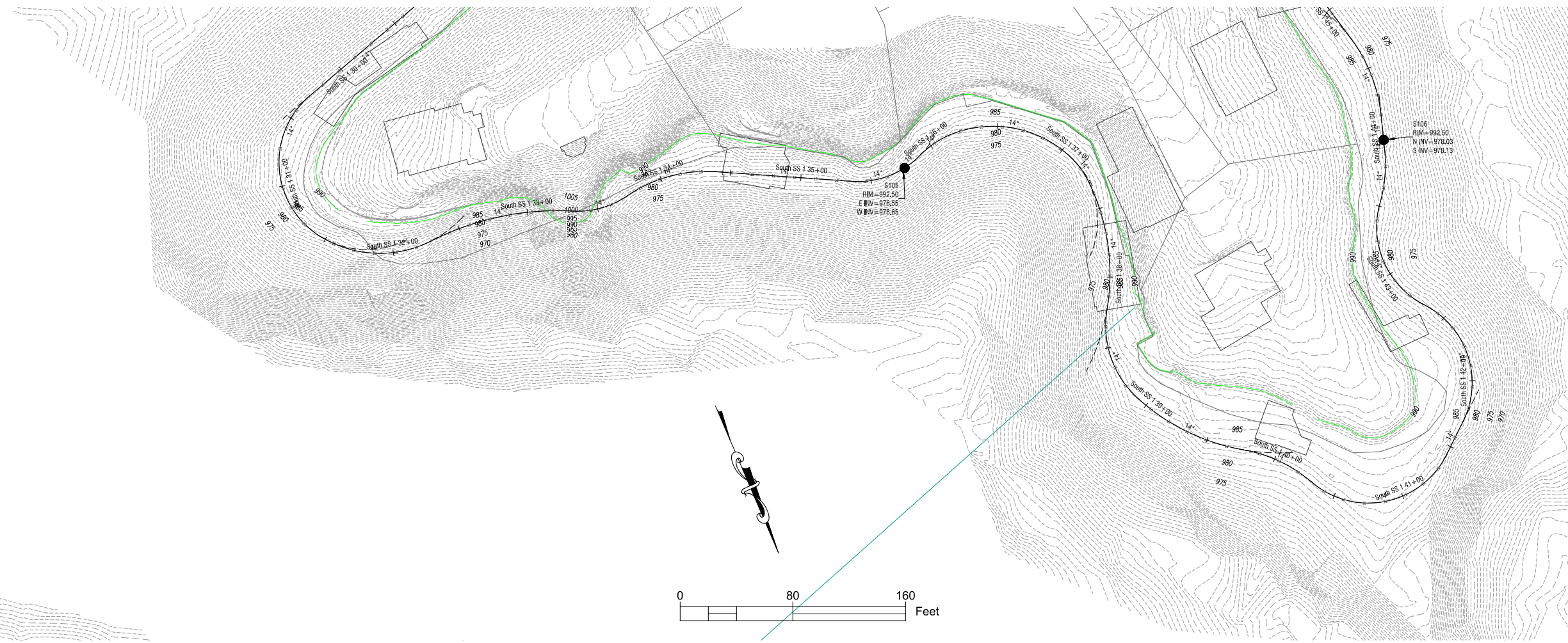
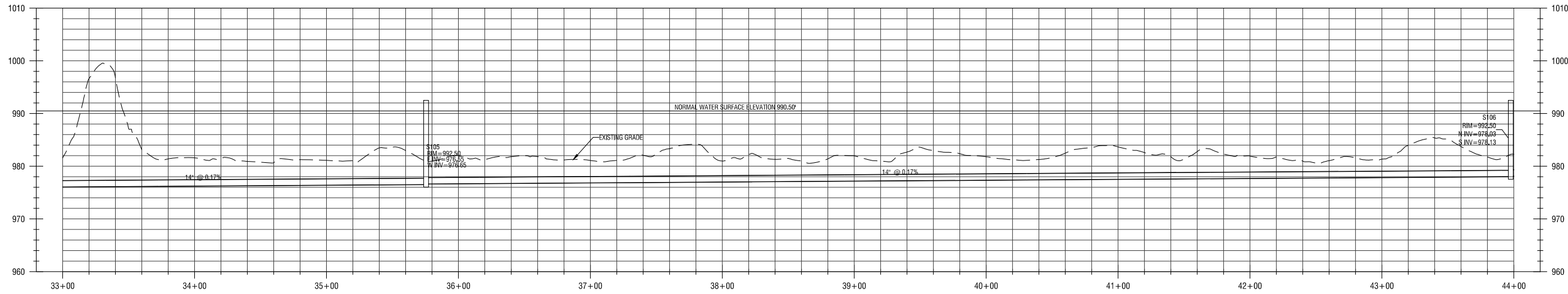
**SOUTH ALIGNMENT 1
STA 22+00 TO STA 33+00**

DRAWING NUMBER:

C103

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**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
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PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

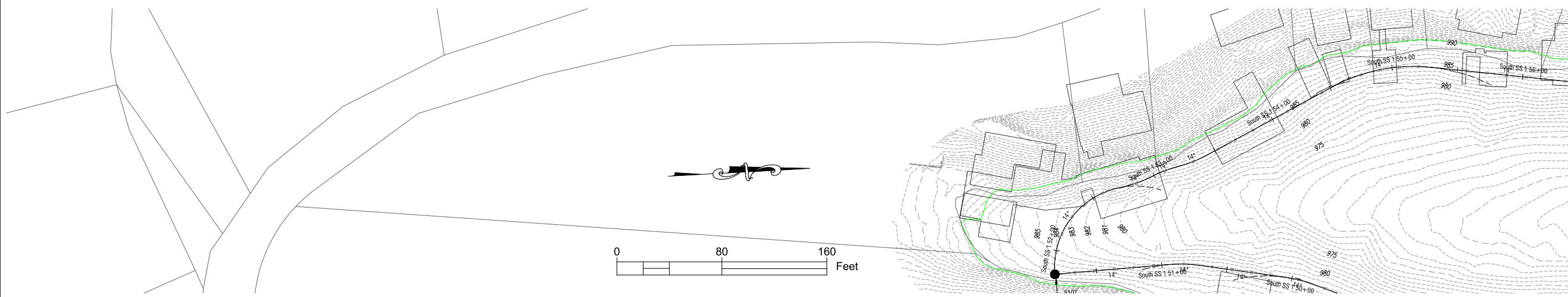
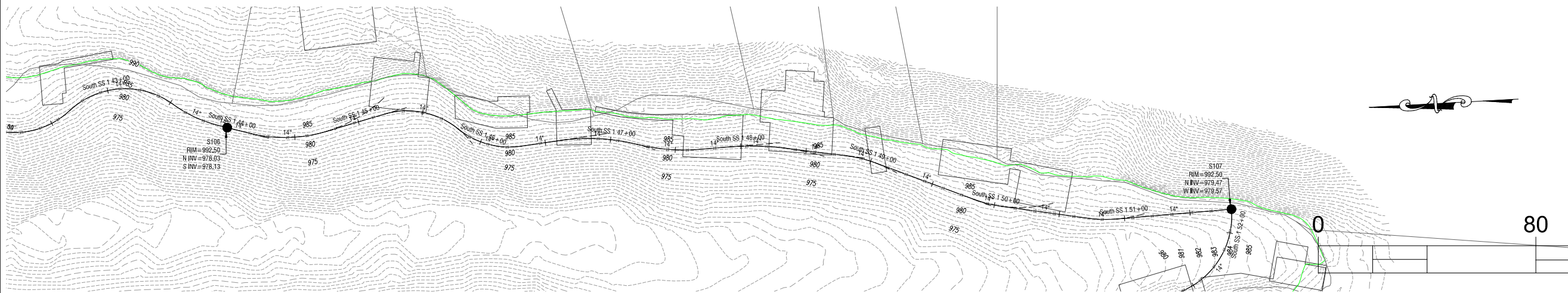
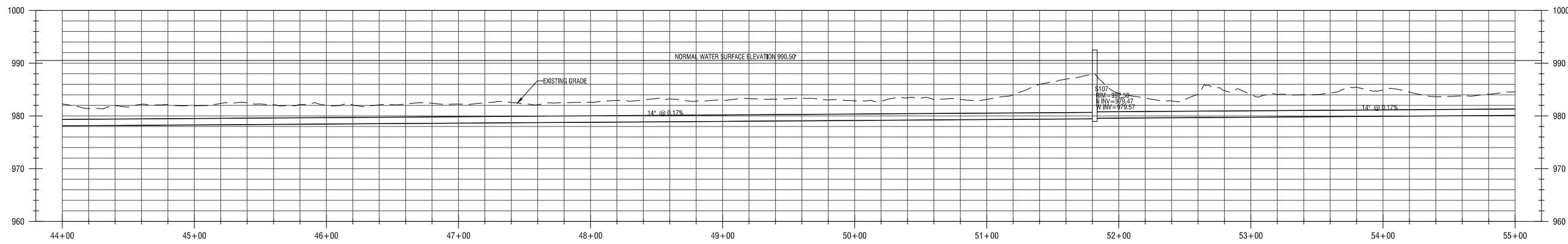
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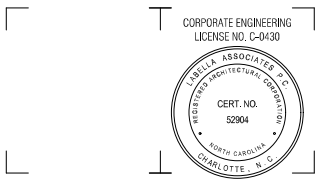
C104

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Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION

PROJECT NUMBER:	2200559
DRAWN BY:	JSB
REVIEWED BY:	BRH
ISSUED FOR:	ISSUED FOR
DATE:	Jan, 2021
DRAWING NAME:	

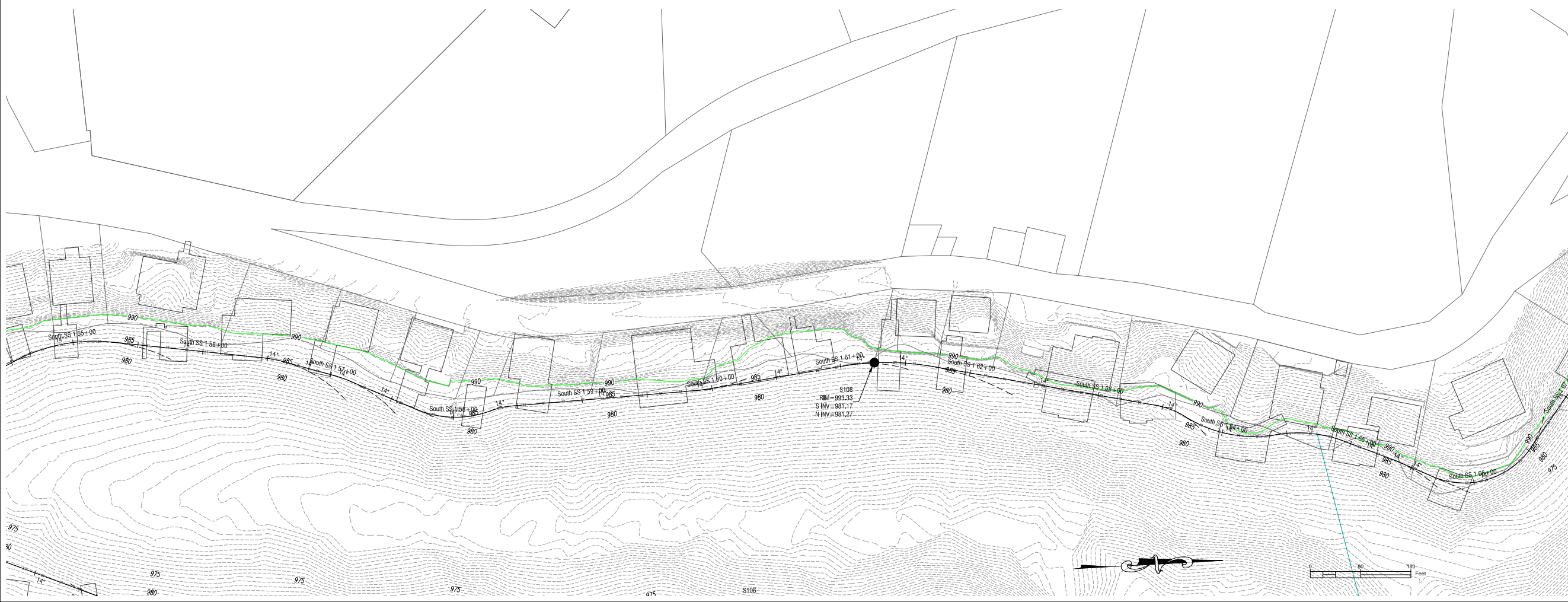
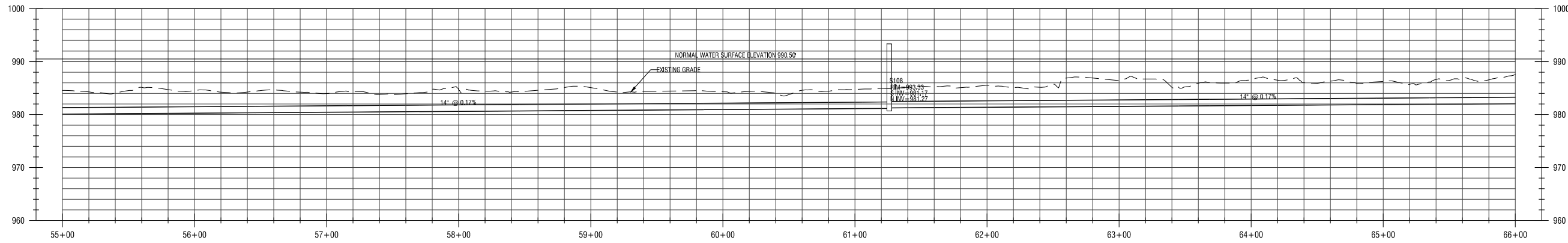
**SOUTH ALIGNMENT 1
STA 44+00 TO STA 55+00**

DRAWING NUMBER:

C105

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**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

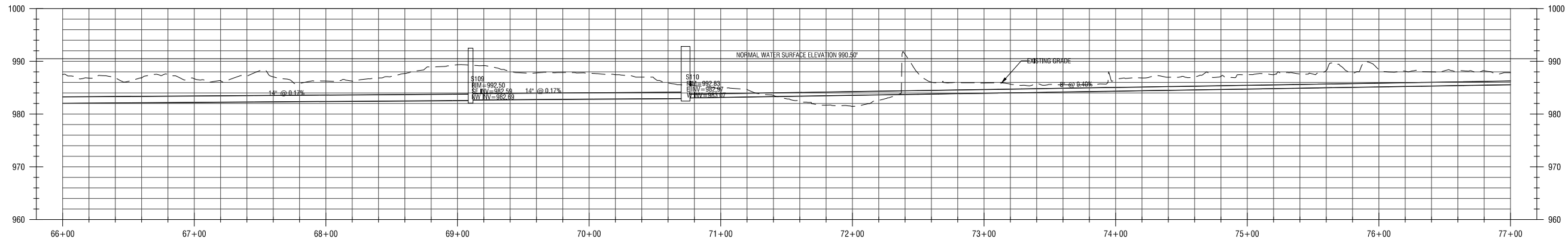
**SOUTH ALIGNMENT 1
STA 55+00 TO STA 66+00**

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Profile View of South SS 1



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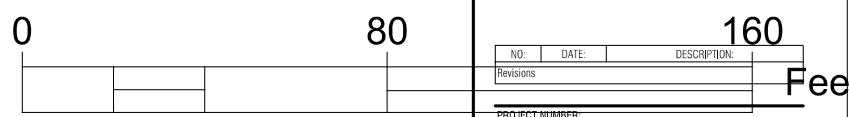
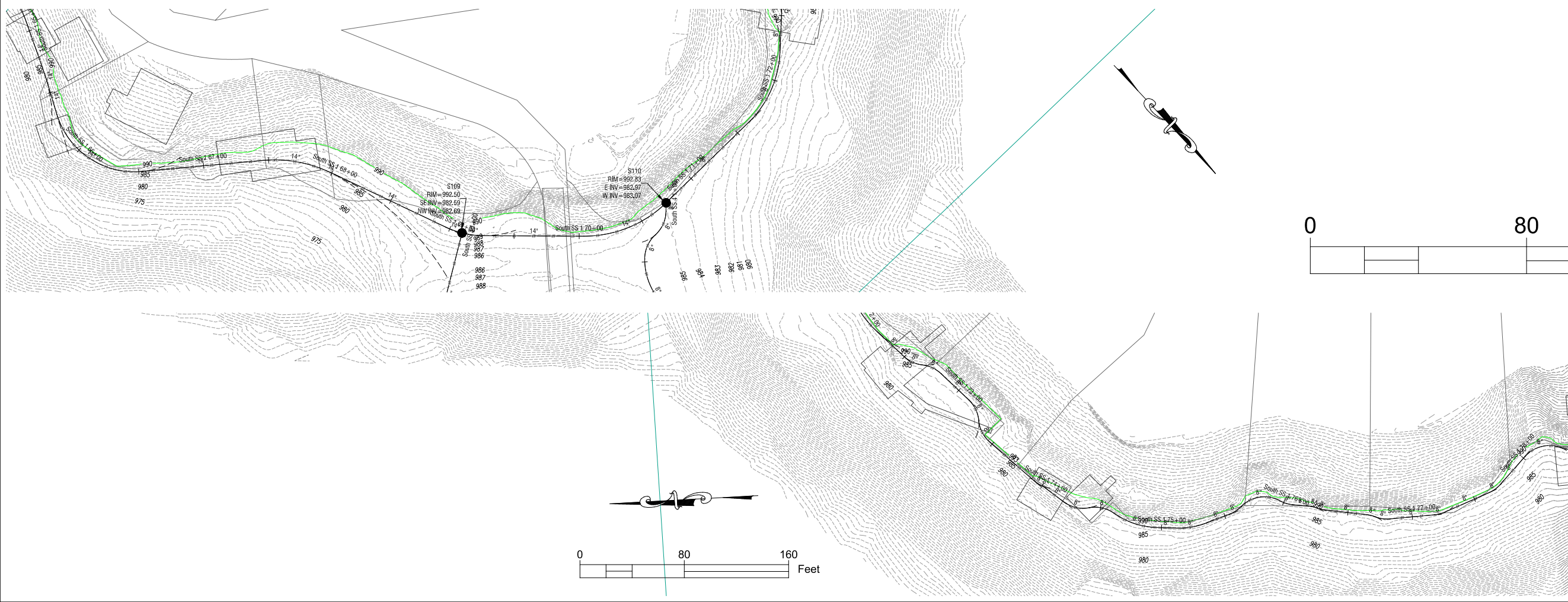


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2948 Memorial Highway
PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
Revisions		

PROJECT NUMBER:	2200559
DRAWN BY:	JSB
REVIEWED BY:	BRH
ISSUED FOR:	ISSUED FOR
DATE:	Jan, 2021
DRAWING NAME:	

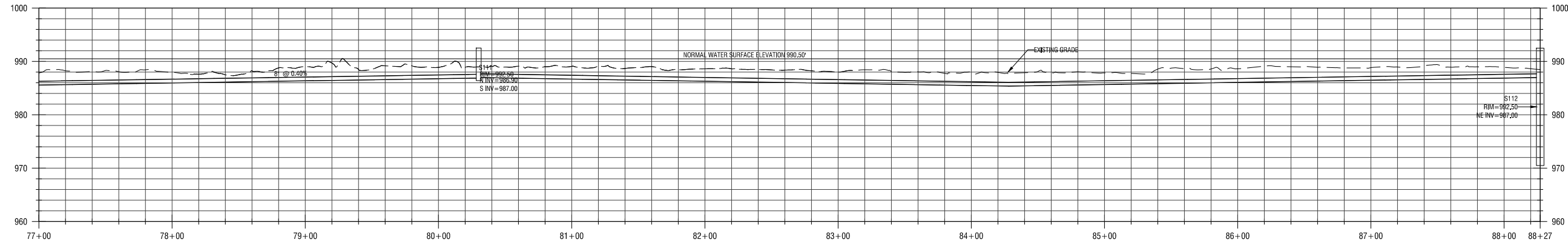
**SOUTH ALIGNMENT 1
STA 66+00 TO STA 77+00**

DRAWING NUMBER:

C107

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**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
Revisions		

PROJECT NUMBER: 2200559

DRAWN BY: JSB

REVIEWED BY: BRH

ISSUED FOR: ISSUED FOR

DATE: Jan, 2021

DRAWING NAME:

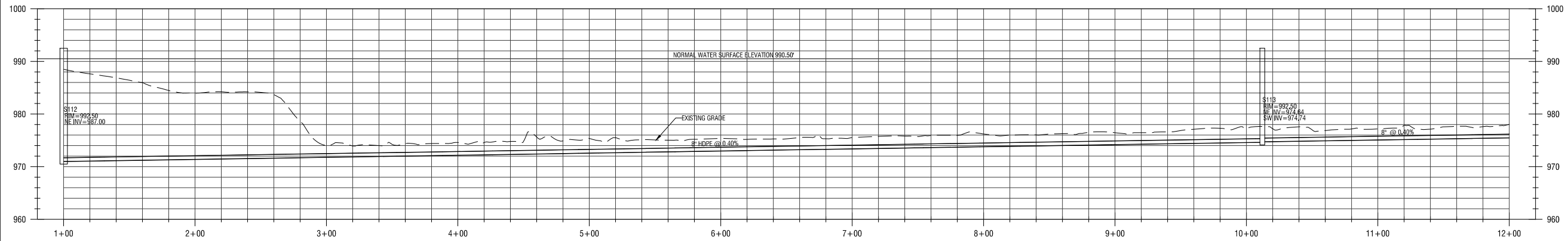
**SOUTH ALIGNMENT 1
STA 77+00 TO STA 88+27**

DRAWING NUMBER:

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Profile View of South SS 2



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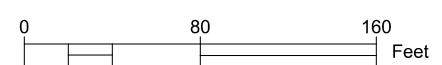
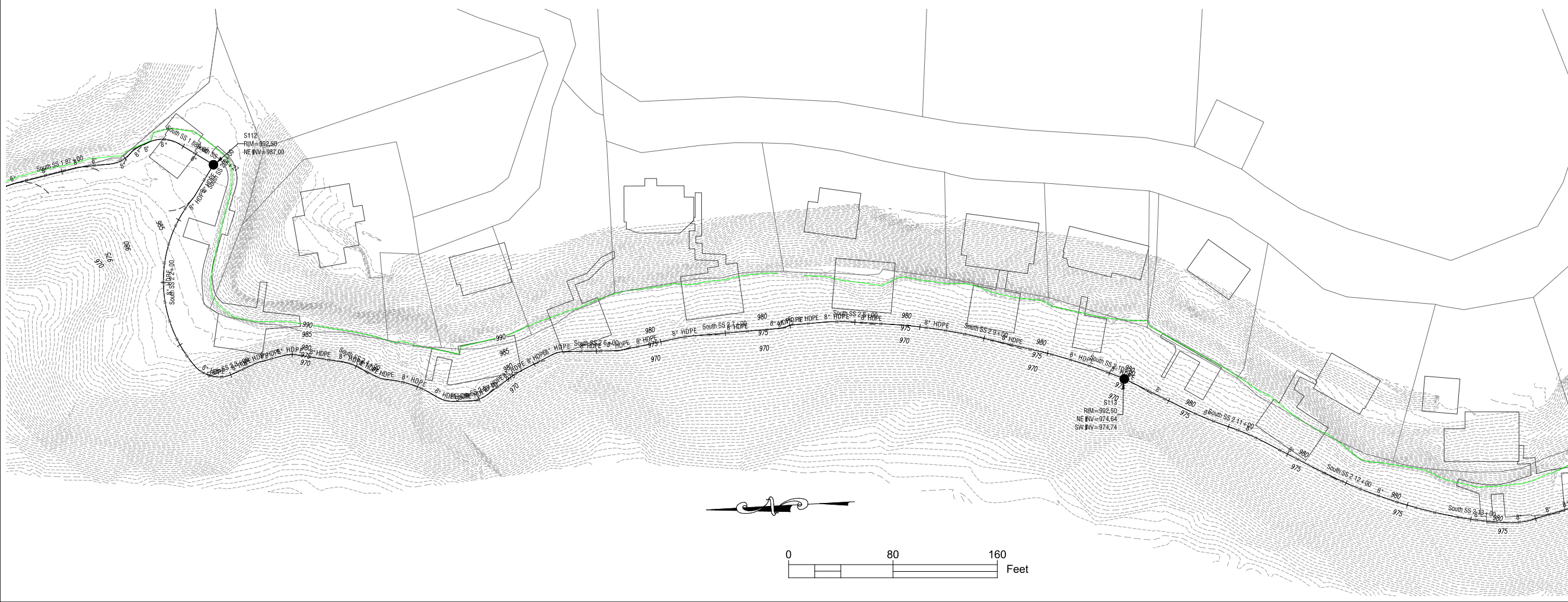


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2948 Memorial Highway
PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
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PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

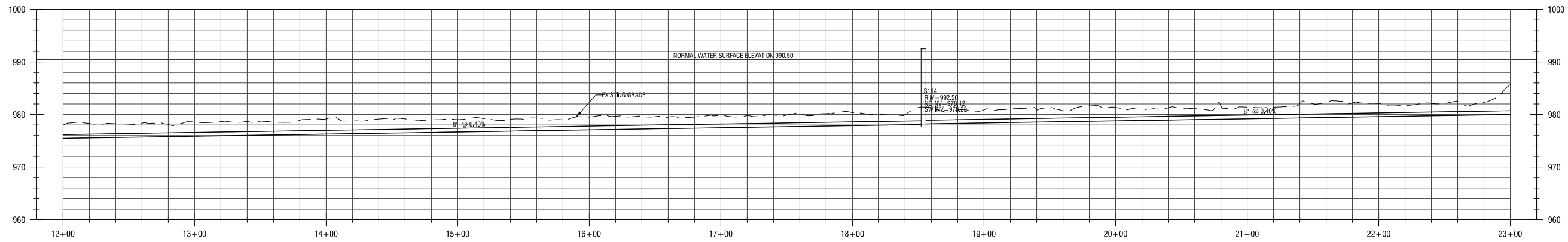
**SOUTH ALIGNMENT 2
STA 1+00 TO STA 12+00**

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Profile View of South SS 2



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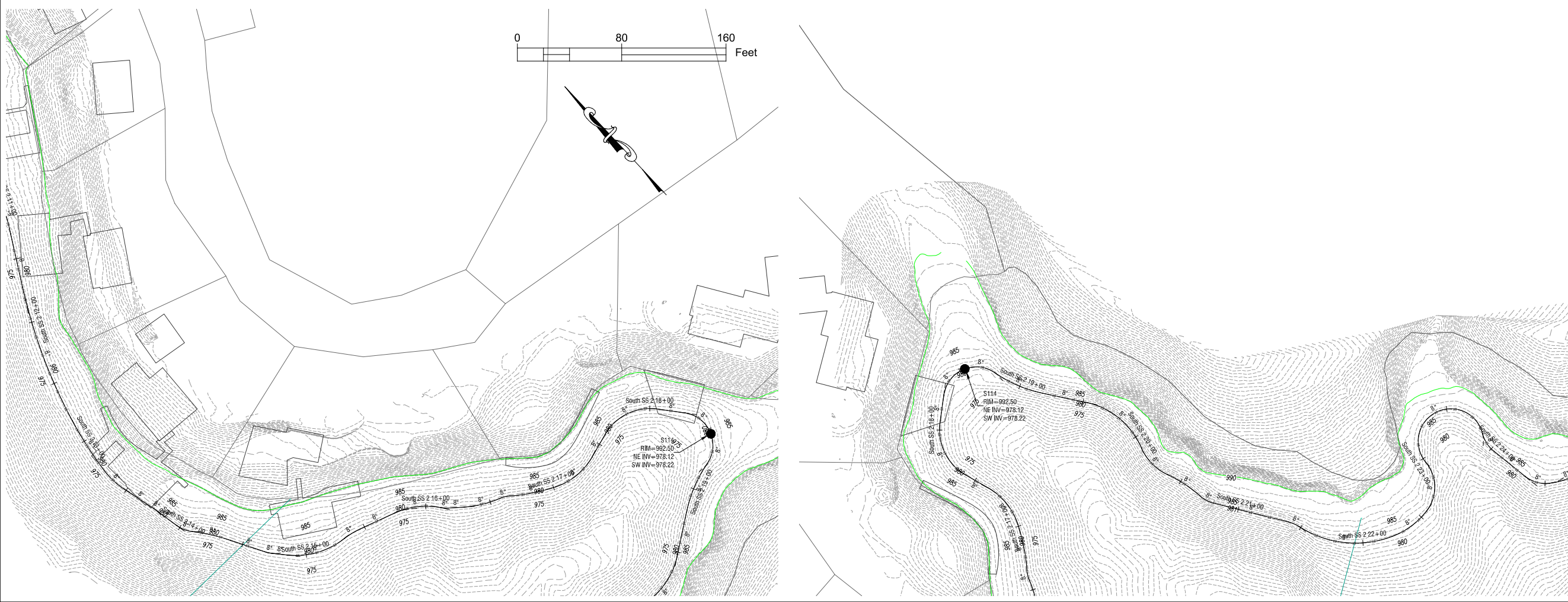


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2948 Memorial Highway
PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
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REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

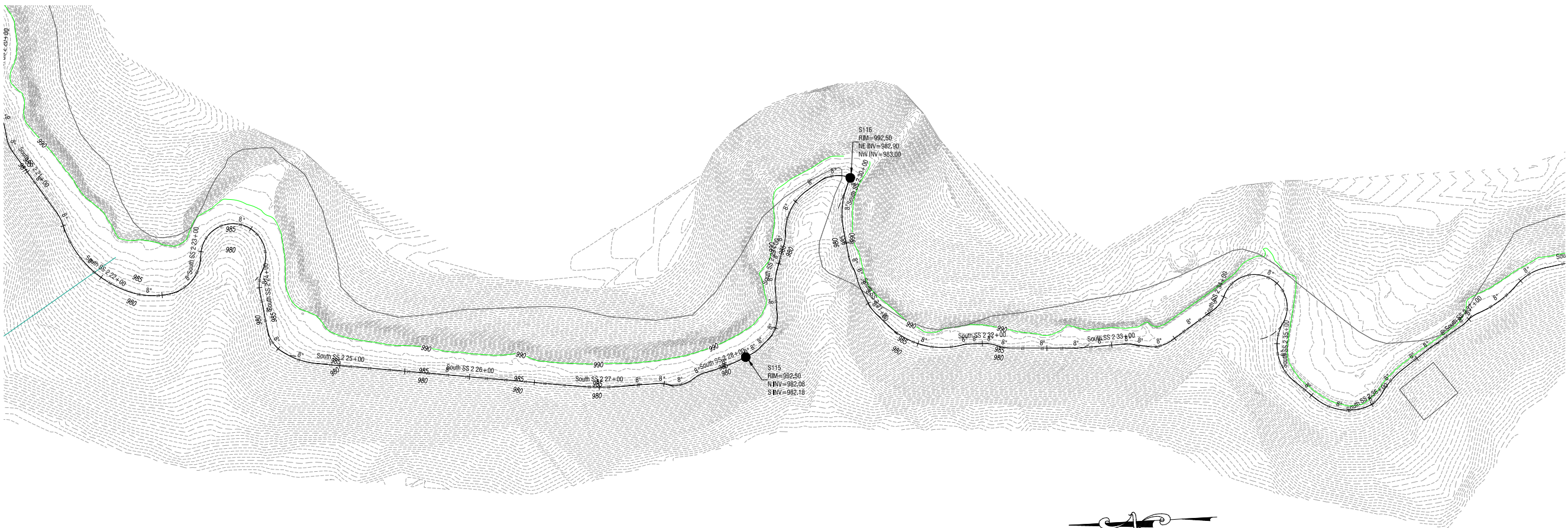
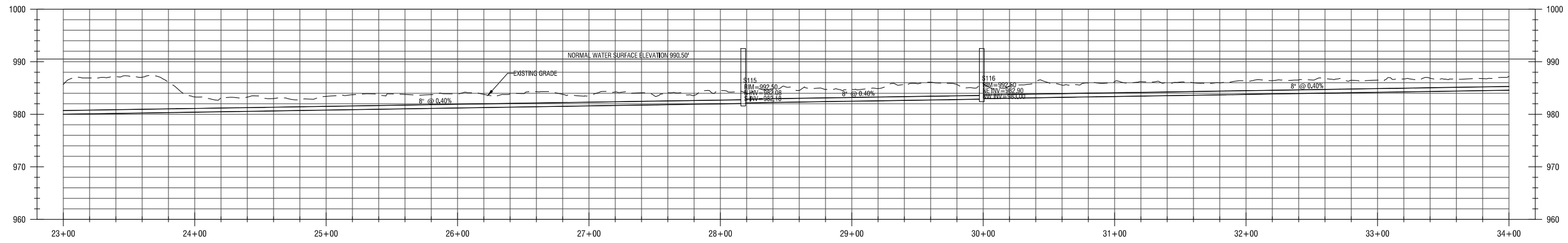
**SOUTH ALIGNMENT 2
STA 12+00 TO STA 23+00**

DRAWING NUMBER:

C202

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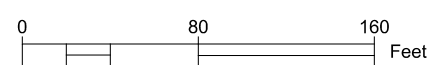
Town of Lake Lure
2948 Memorial Highway
PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
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DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

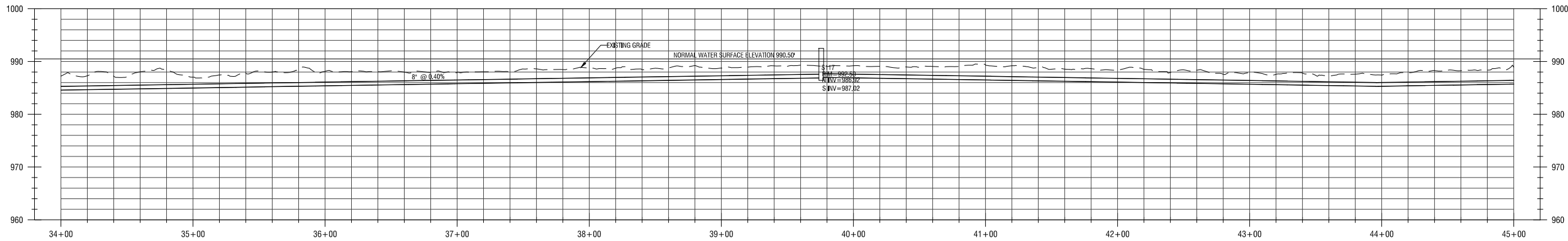
**SOUTH ALIGNMENT 2
STA 23+00 TO STA 34+00**



C203

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Lake Lure, NC 28746

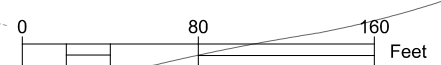


**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
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ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

**SOUTH ALIGNMENT 2
STA 34+00 TO STA 45+00**

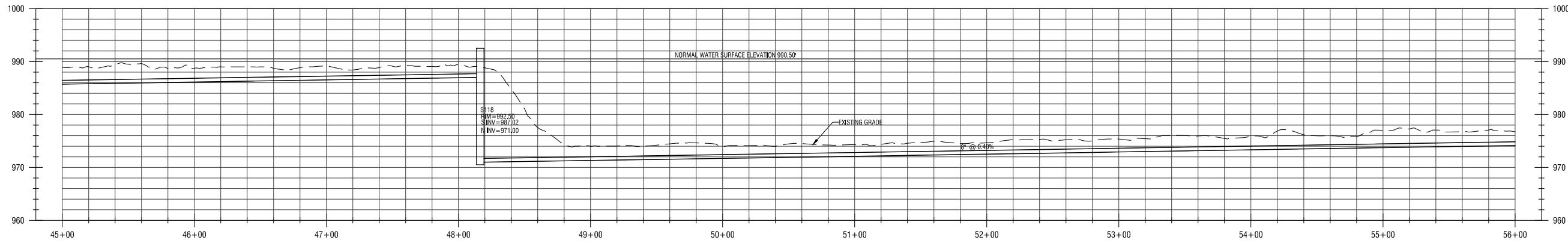


DRAWING NUMBER:

C204

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Profile View of South SS 2



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2948 Memorial Highway
PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

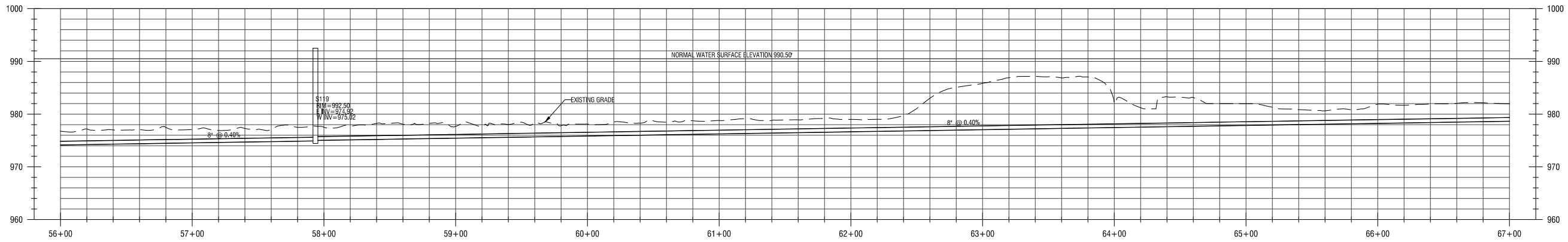
**SOUTH ALIGNMENT 2
STA 45+00 TO STA 56+00**

DRAWING NUMBER:

C205

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Profile View of South SS 2



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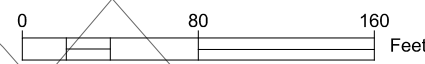


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2948 Memorial Highway
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Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

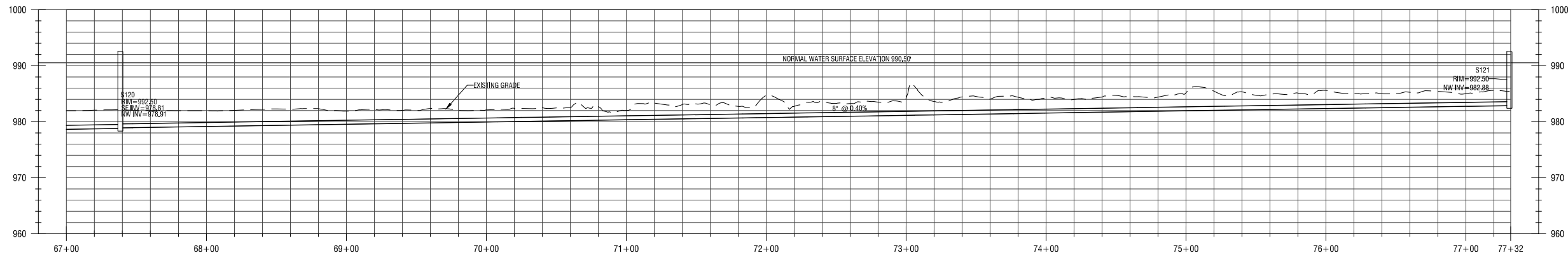
**SOUTH ALIGNMENT 2
STA 56+00 TO STA 67+00**

DRAWING NUMBER:

C206

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Profile View of South SS 2



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PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

**SOUTH ALIGNMENT 2
STA 67+00 TO STA 77+32**

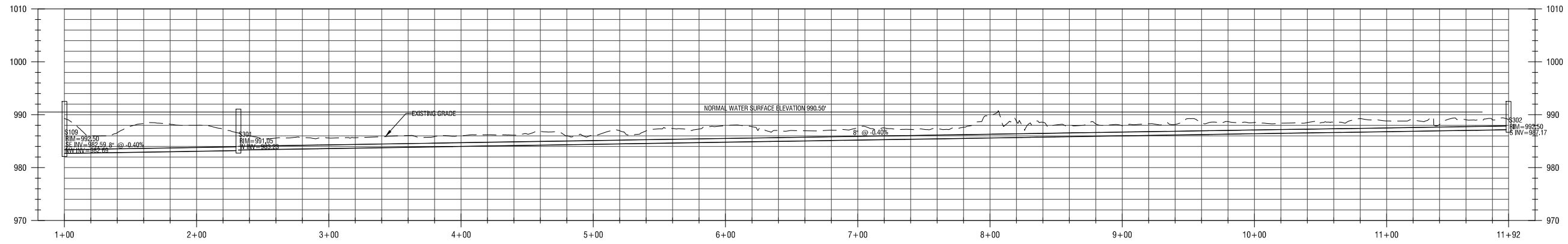
DRAWING NUMBER:

C207



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Profile View of South SS 3



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PO Box 225
Lake Lure, NC 28746



**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
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REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

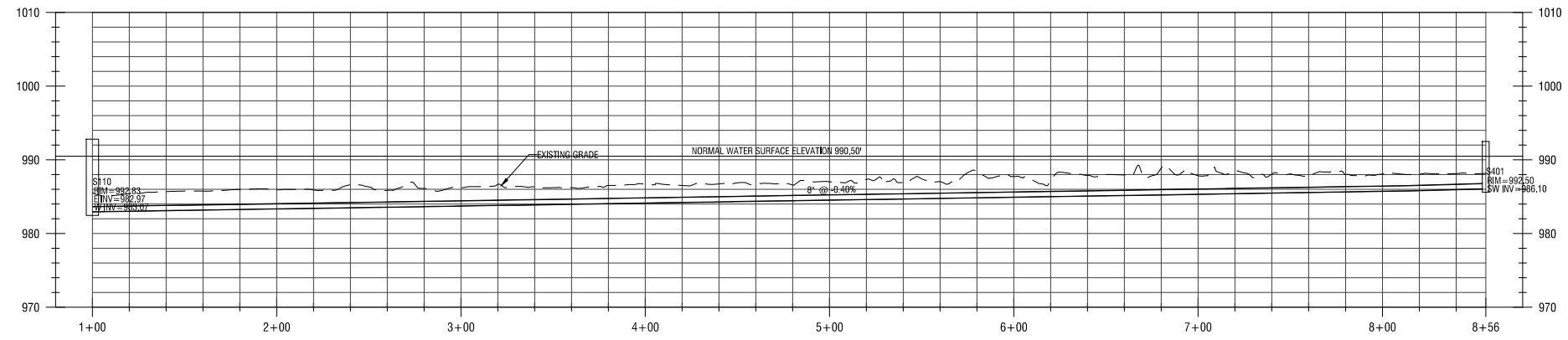
**SOUTH ALIGNMENT 3
STA 1+00 TO STA 11+92**

DRAWING NUMBER:

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DRAWINGS ARE PRINTED AT A
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Profile View of South SS 4



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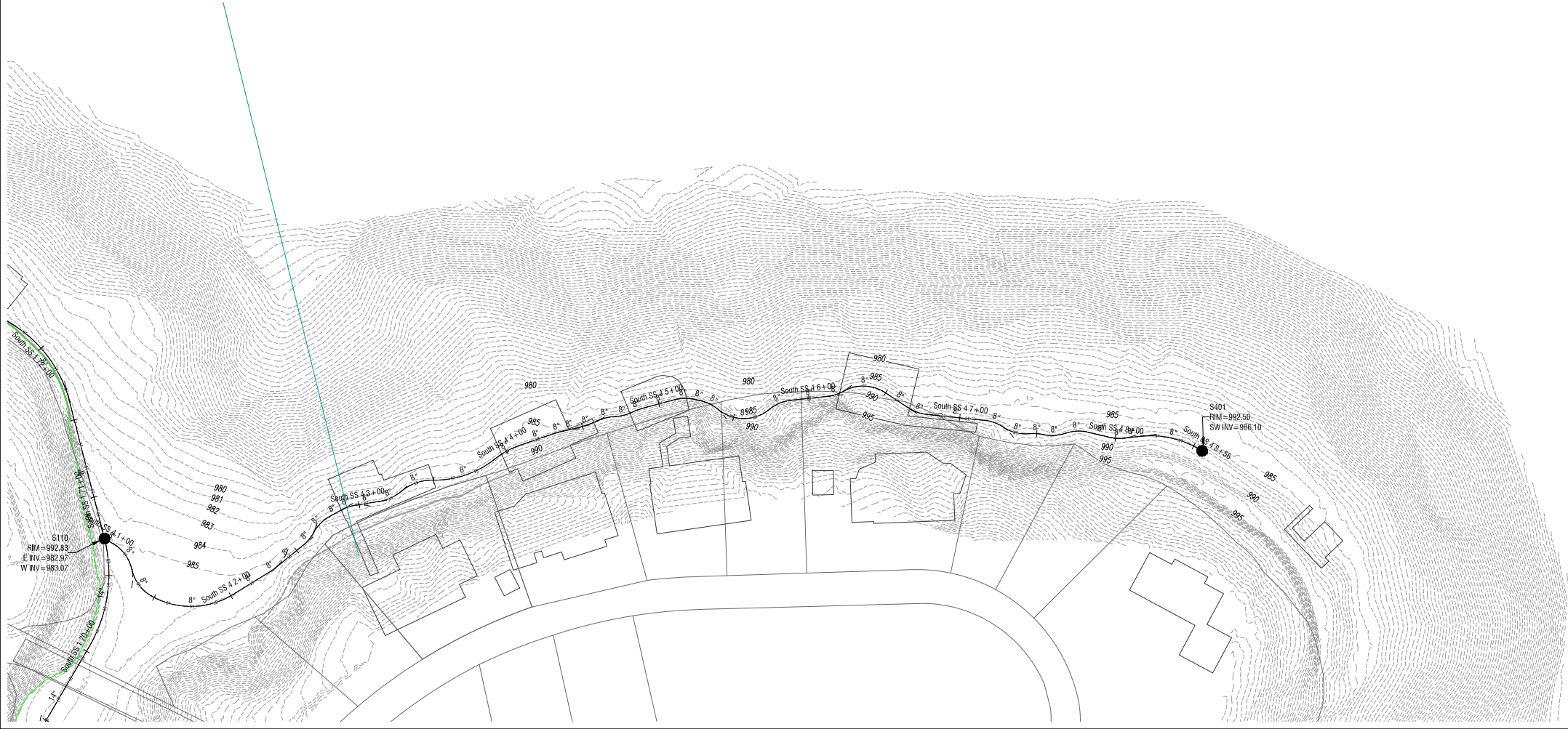


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**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
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PROJECT NUMBER:		2200559
DRAWN BY:		JSB
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DRAWING NAME:		

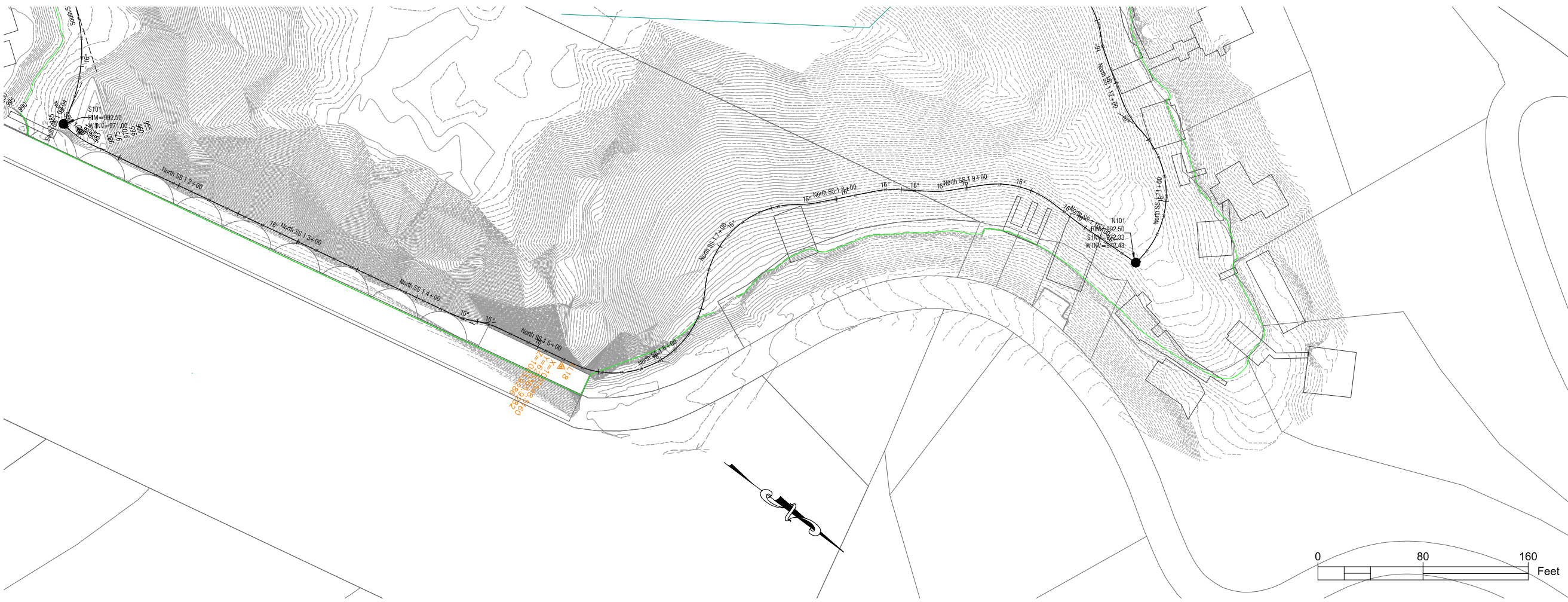
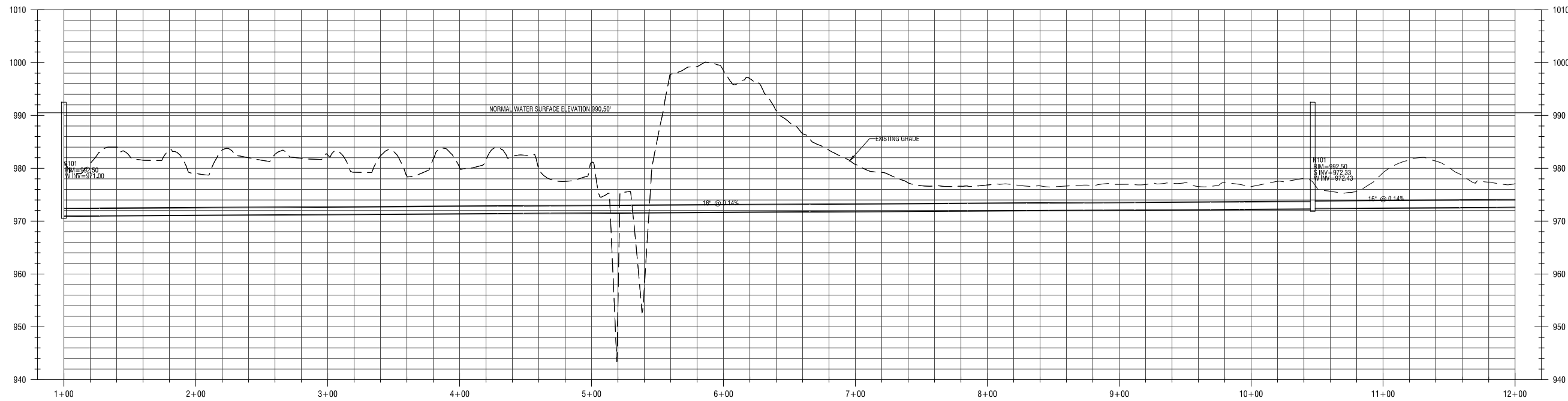
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STA 1+00 TO STA 8+56**

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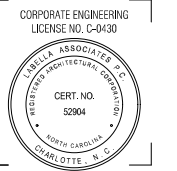
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**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
System - Phase I**

NO.	DATE	DESCRIPTION
Revisions		
PROJECT NUMBER:		2200559
DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

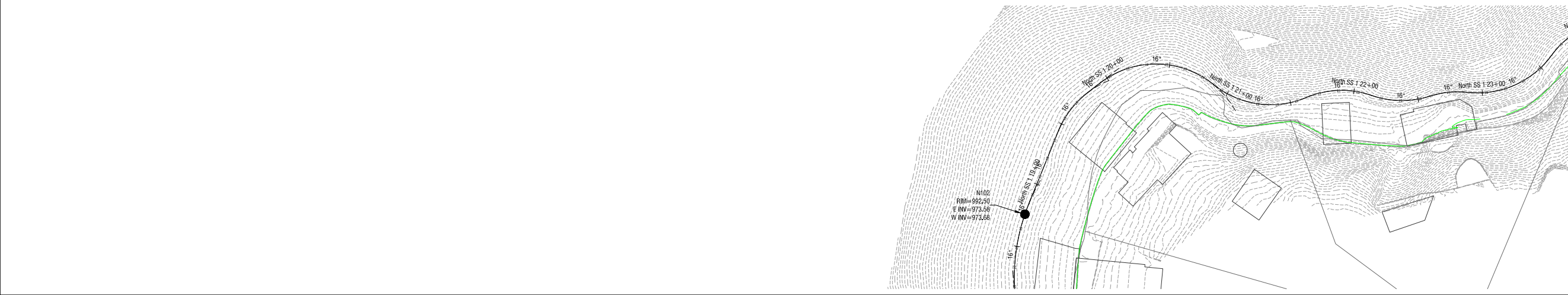
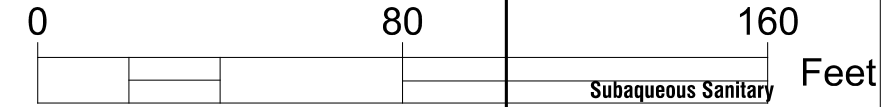
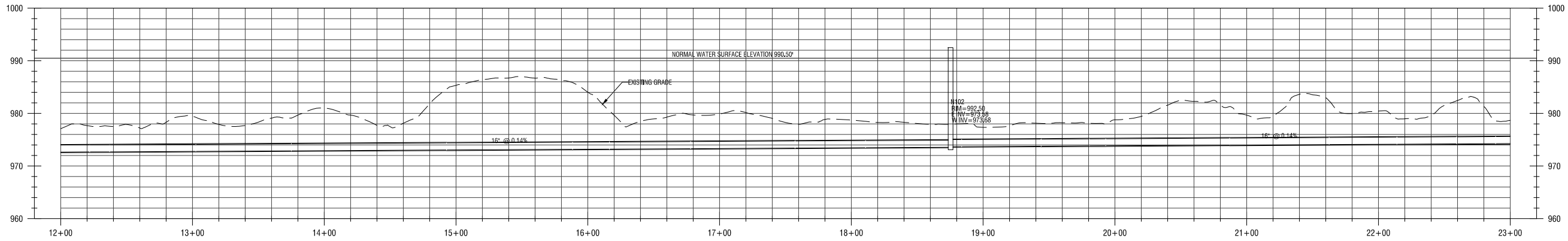
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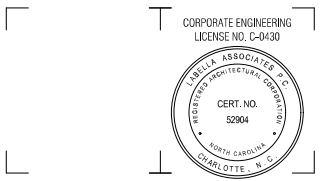
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DRAWN BY:		JSB
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DATE:		Jan, 2021
DRAWING NAME:		

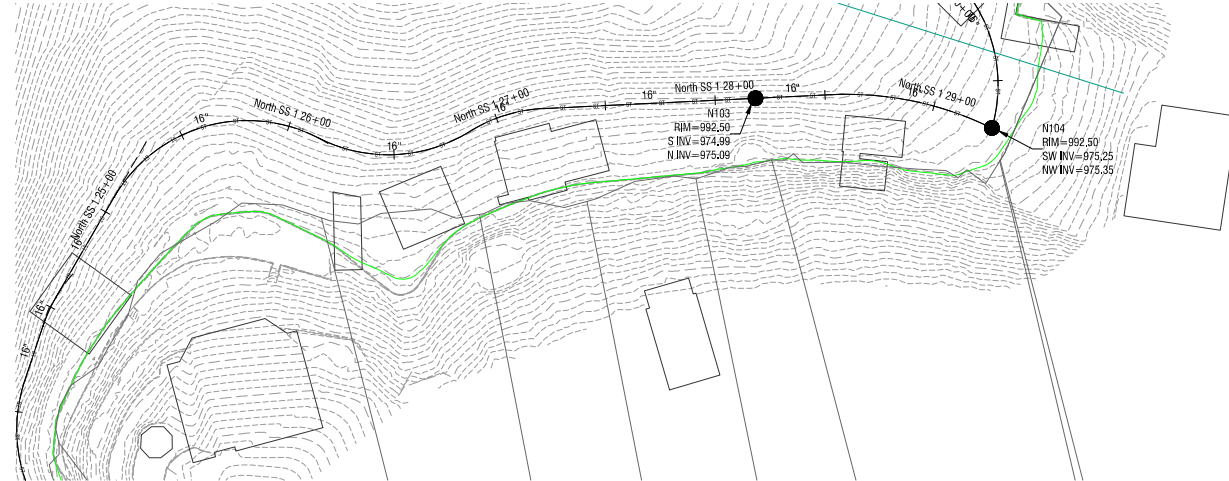
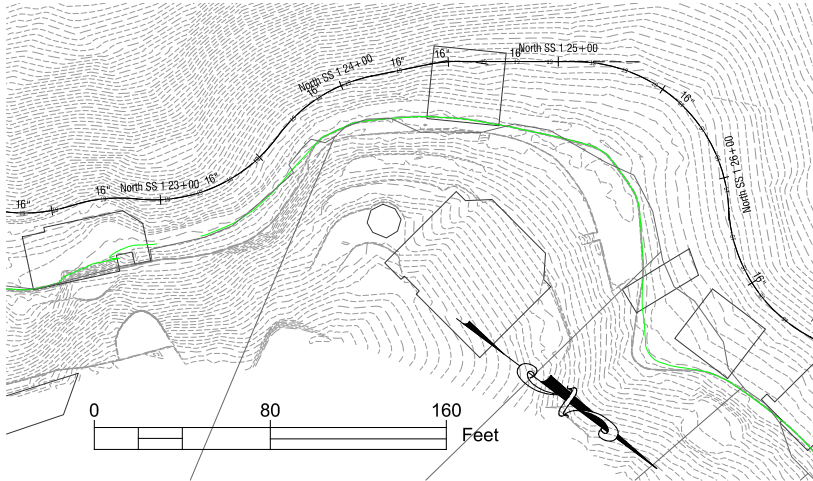
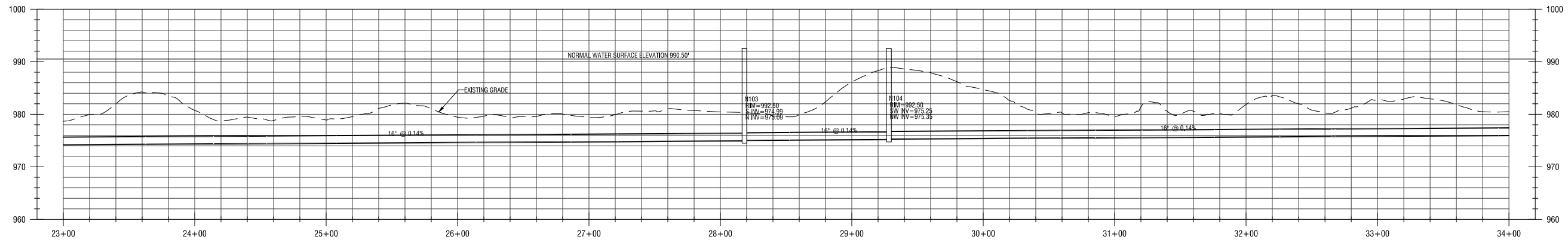
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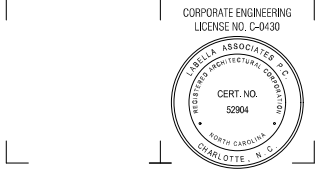
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**Subaqueous Sanitary
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Revisions		
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DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

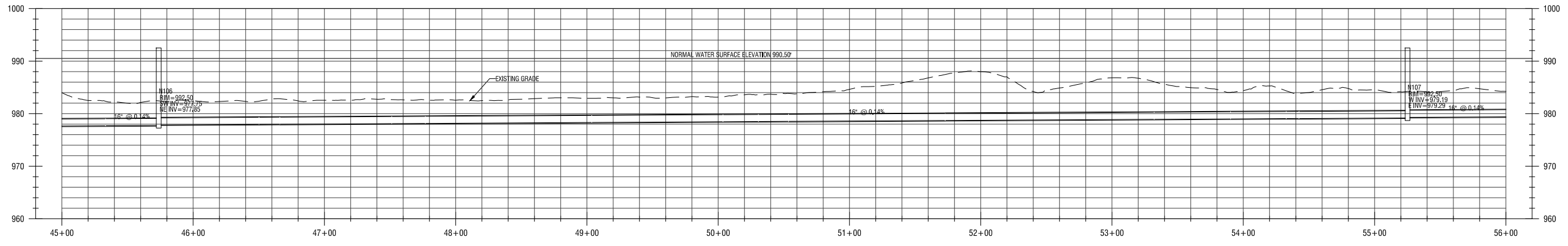
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STA 23+00 TO STA 34+00**

DRAWING NUMBER:

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**Subaqueous Sanitary
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Gravity-Lift Station
System - Phase I**



NO.	DATE	DESCRIPTION
Revisions		

PROJECT NUMBER: 2200559

DRAWN BY: JSB

REVIEWED BY: BRH

ISSUED FOR: ISSUED FOR

DATE: Jan, 2021

DRAWING NAME:

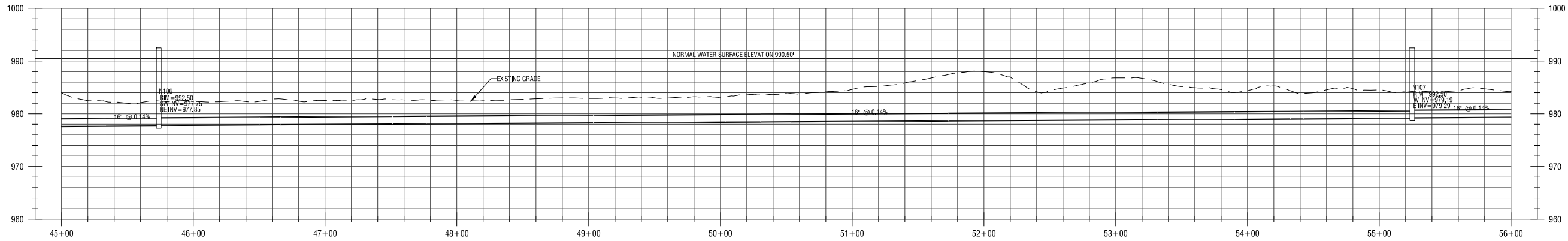
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STA 34+00 TO STA 45+00**

DRAWING NUMBER:

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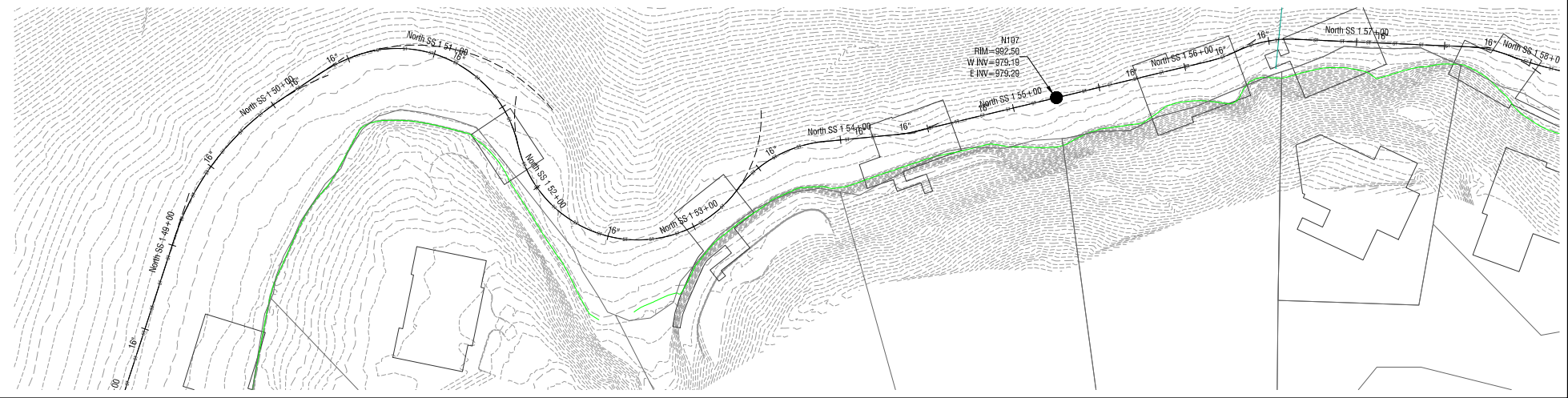
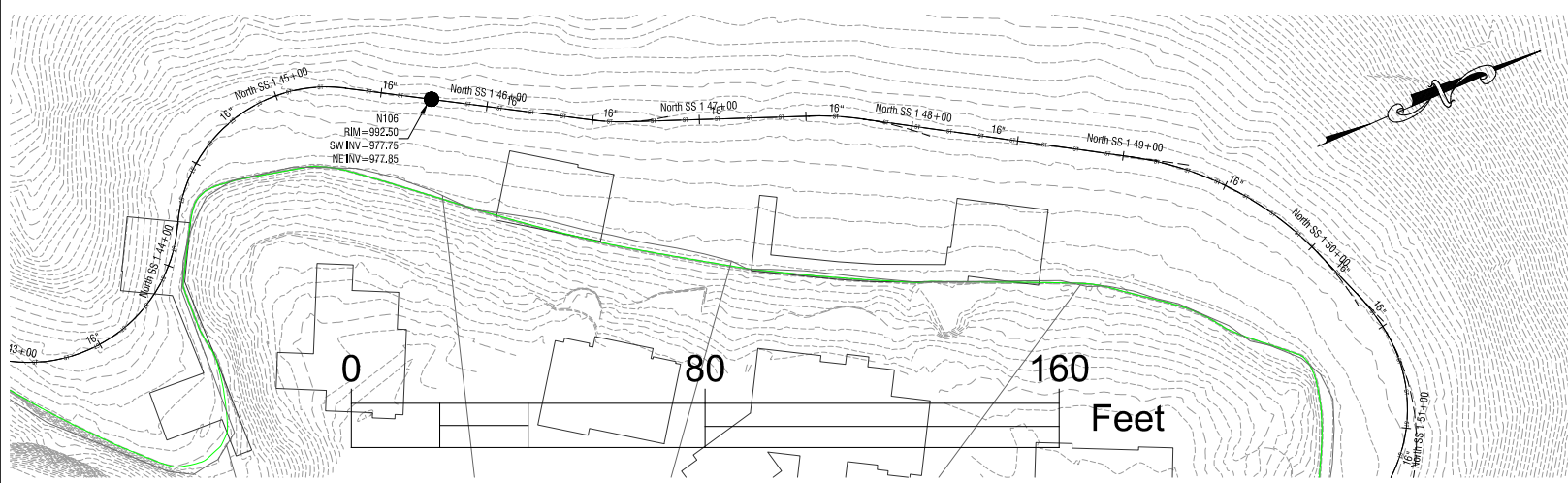


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**Subaqueous Sanitary
Sewer Replacement
Gravity-Lift Station
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DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

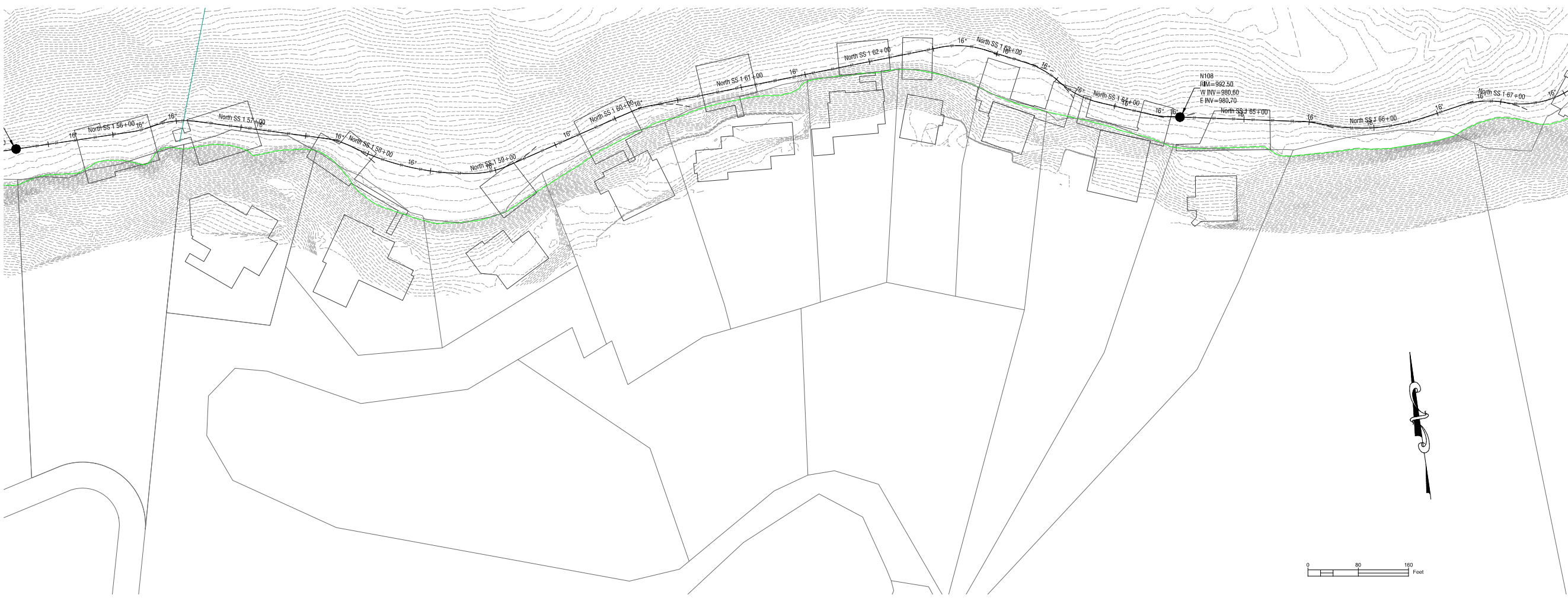
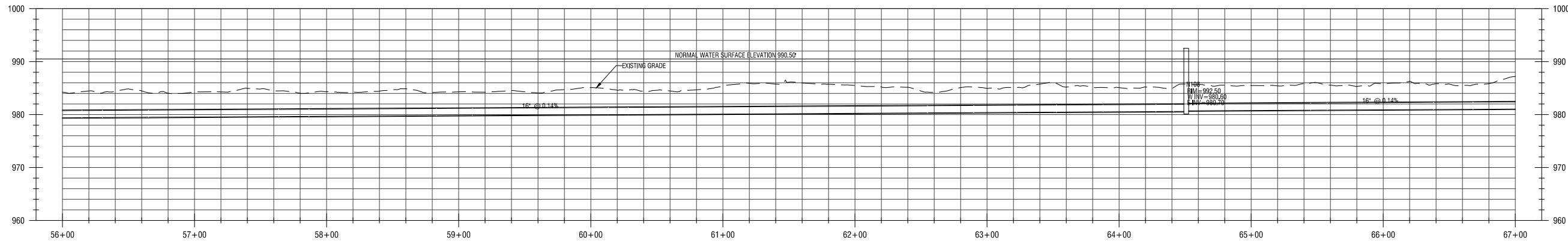
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STA 45+00 TO STA 56+00**

DRAWING NUMBER:

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**Subaqueous Sanitary
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DATE:		Jan, 2021
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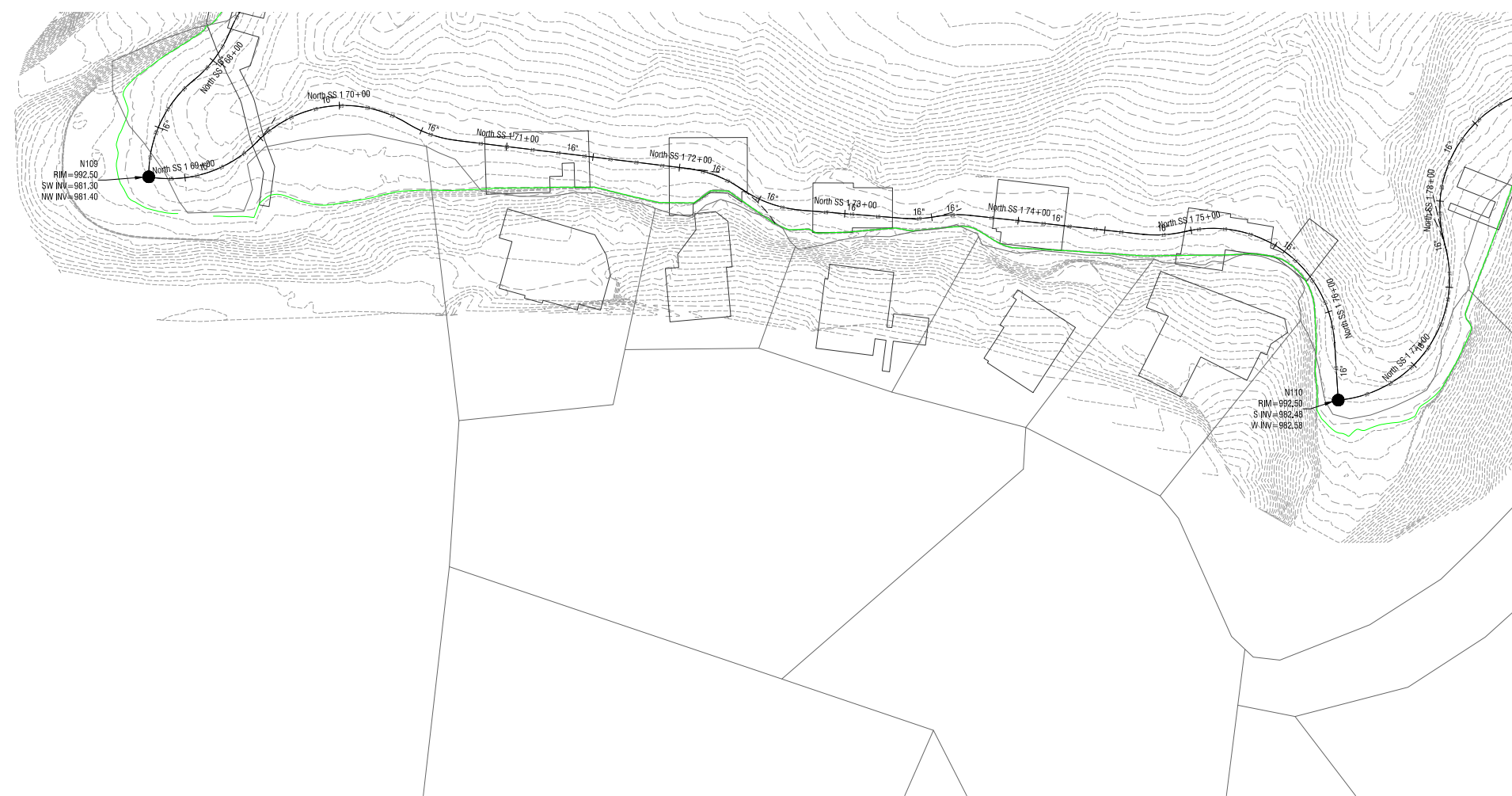
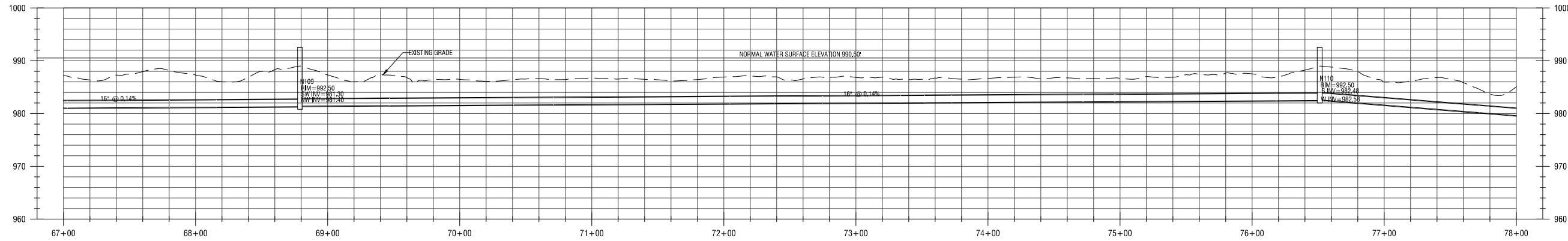
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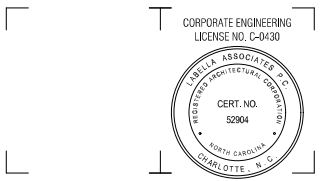
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**Subaqueous Sanitary
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DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

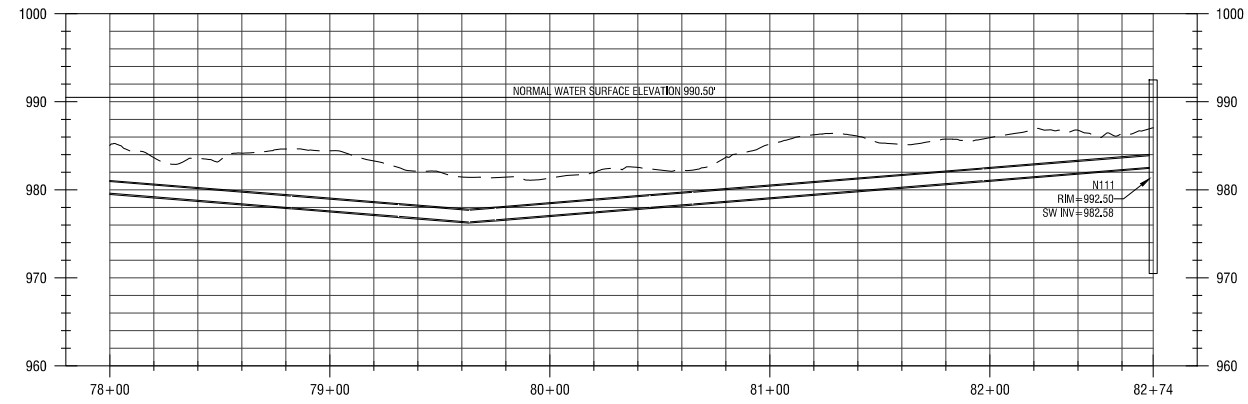
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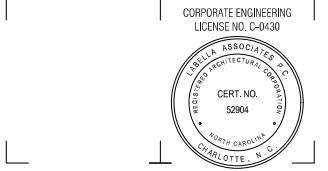
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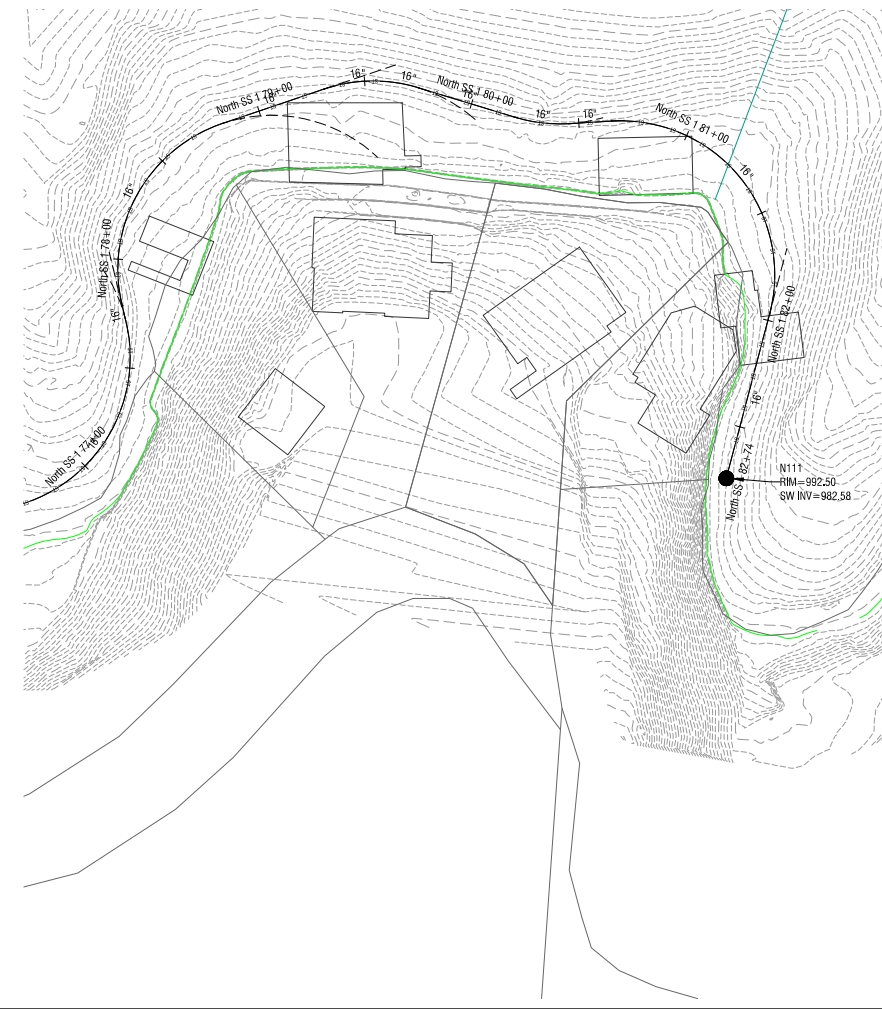


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**Subaqueous Sanitary
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DRAWN BY:		JSB
REVIEWED BY:		BRH
ISSUED FOR:		ISSUED FOR
DATE:		Jan, 2021
DRAWING NAME:		

**NORTH ALIGNMENT 1
STA 78+00 TO STA 82+74**

DRAWING NUMBER:

C508

APPENDIX L

The Draper Plan

Construction of the Dam

"The construction of the dam was one of the most vital concerns confronting the company. ...the celebrated hydraulic firm of Mees & Mees, of Charlotte, N.C., was employed. This firm is probably the most outstanding designer of dams in the South."

Prospectus, 1926.



The Numbers: As planned, the dam was to be 104 feet high, 585 feet long, and would generate 13,500,000 kilowatts hours annually. The Blue Ridge Power Company of Spartanburg purchased the electricity for \$67,500 a year, enough to cover

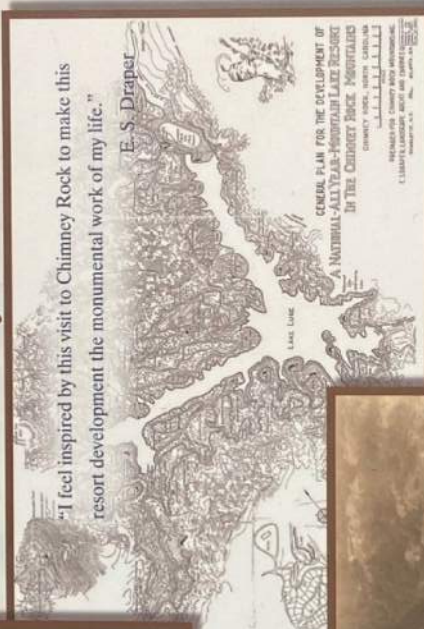
the cost of the dam in ten years. It is still generating power for sale to Duke Energy.



"the monumental work of my life..."



A friend of textile executive Kenneth Tanner, E.S. Draper had previously designed several major projects in Rutherford County: the mill villages for Alexander and Spindale Mills and the campuses of schools in Rutherford and Cliffsides.



"I feel inspired by this visit to Chimney Rock to make this resort development the monumental work of my life."

E. S. Draper

"Early in 1924 a large force of engineers under the direction of Mr. E. S. Draper, entered upon the task of working out exhaustive details for the resort development. Mr. Draper is a nationally known Landscape Architect with offices in Charlotte, New York and Atlanta."

Lake Lure at Chimney Rock, A Pictorial (Promotional brochure, 1926)



Courtesy of Jim Proctor



Courtesy of Jim Proctor



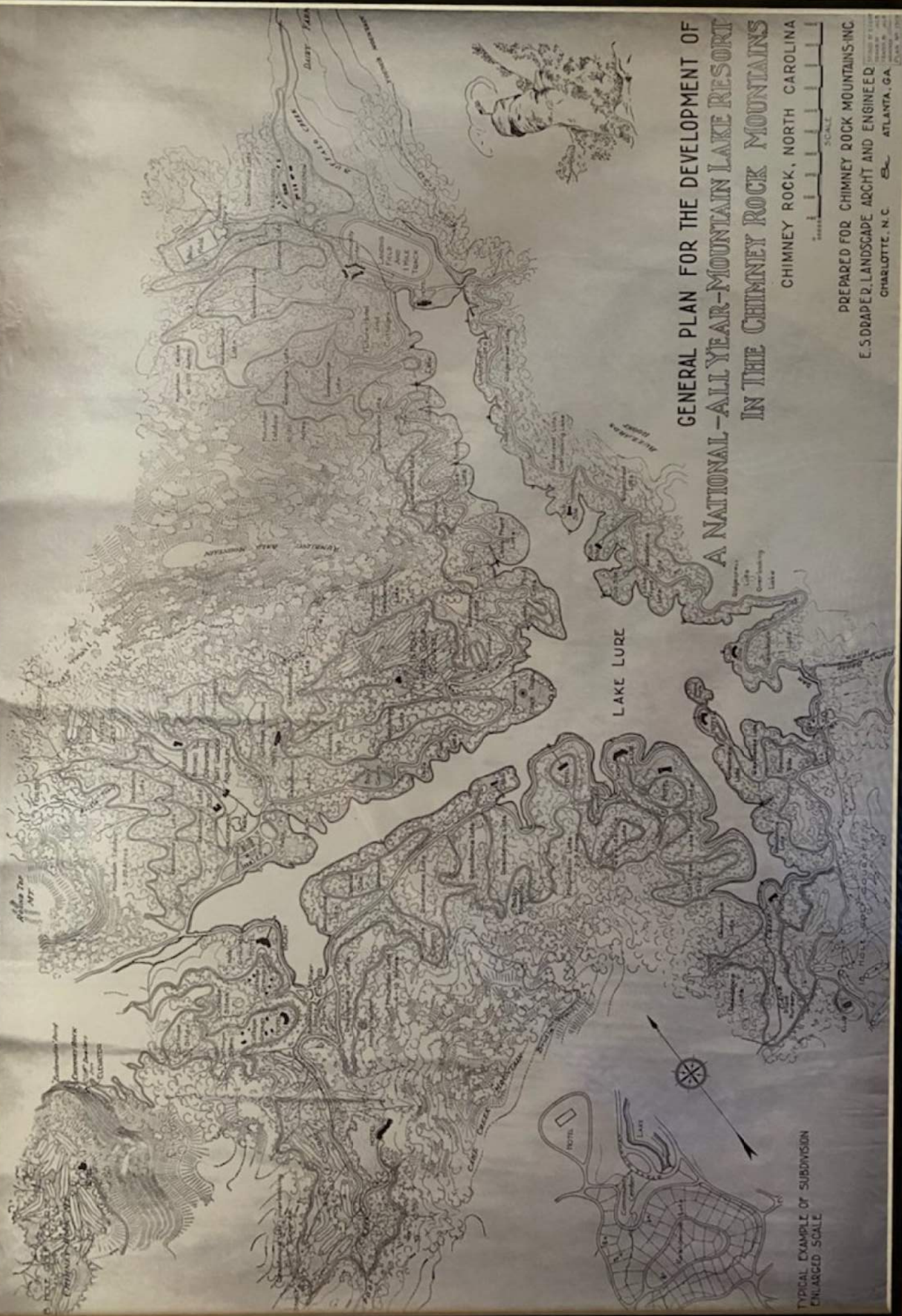
The Gray Family Collection

The architectural firm of G. Lloyd Preacher & Co., with headquarters in Atlanta, designed the 1927 Lake Lure Inn (above) and "Arcade" building (right) in a Mediterranean style evoking resorts of the Italian Riviera. Although the Great Depression that began in 1929 interrupted the realization of Draper's design for development of Lake Lure, the Inn and Arcade building are located as Draper intended. The Ward/Haynes House (lower right), one of the early homes at Lake Lure, was built with the signature arches and stucco finish of the resort.

GENERAL PLAN FOR THE DEVELOPMENT OF
 A NATIONAL-ALL YEAR-MOUNTAIN LAKE RESORT
 IN THE CHIMNEY ROCK MOUNTAINS

CHIMNEY ROCK, NORTH CAROLINA

PREPARED FOR CHIMNEY ROCK MOUNTAINS, INC.
 E. S. DRAPER, LANDSCAPE ARCHT AND ENGINEER
 CHARLOTTE, N. C. ATLANTA, GA.



TYPICAL EXAMPLE OF SUBDIVISION
 ENLARGED SCALE

APPENDIX M

Comment Response Letters (2)
Letter requesting extension of loan
term to 30-years

Wastewater Collection System Improvements Subaqueous Sanitary Sewer Replacement

Technical Comments

Response to NCDWI Email dated May 13, 2021

LaBella Commission Number: 2170369

NCDWI Project Number: CS370744-05

Comment Number	Original Comment	Comment By	Initial Response	Response By
T - Technical Comments				
T-1	Section 5.0, 6.0 and executive summary should mention that the WWTP is currently rated for 0.995 MGD and will be replaced with 0.995 MGD system.	DWI T. Desai	This detail has been added to Section 1.1 as the last sentence of the section, Section 5.1.3 as the last sentence of the section, Section 6.2 as the last sentence of the section, and Section 6.3 as the last sentence of the 3rd paragraph of the section.	LaBella H. Miller
T-2	SBR alternative should mention tertiary filters in Section 5.0. Add a separate line item for tertiary filters in Table 5.2.41 on page 134 of the report and all relevant sections and tables.	DWI T. Desai	Tertiary filters are added to the description in section 5.4.3.1. Table 5.2.41 have been updated to include a line item for tertiary filters. Tables 5.2.42 -5.2.48 and 5.2.92 have been updated.	LaBella M. Walsh
T-3	Update titles of financial analysis tables in Section 8.0 to specify which table is for 30 year loan term and which one is for 20 years.	DWI T. Desai	Titles have been updated in Section 8.0 to specify which tables provide information for a 30 year loan term and which tables provide information for a 20 year loan term.	LaBella H. Miller
E- Environmental Comments				
E-1	DWI has no additional comments, but is waiting for responses from outside agencies	DWI	Acknowledged, please forward any future responses	LaBella M. Walsh
NCWRC - North Carolina Wildlife Resources Commission				
NCWRC-1	Recommendations for Phase 6 (WWTP rebuild) in previous comments still stand. Thank you for the response to comments provided in Appendix M.	NCRC	Acknowledged, these comments will be retained and added to future comments related to Phase 6.	LaBella M. Walsh

Wastewater Collection System Improvements Subaqueous Sanitary Sewer Replacement

Technical Comments

Response to NCDWI Email dated March 29, 2021

LaBella Commission Number: 2170369

NCDWI Project Number: CS370744-05

Comment Number	Original Comment	Comment By	Initial Response	Response By
T - Technical Comments				
T-1	Please include the information provided in the response for B-6c and B6-d in Section 2.0 Current Situation.	DWI T. Desai	This information has been included in Section 2.1.1.1.	LaBella H. Miller
T-2	Use 2.5 peaking factor for collection system and WWTP design. However, this peaking factor is for the completed project. Table 3.2 on page 47 should indicate that peaking factor will be 2.5 after completion of the project i.e. year 2034. Also add the same note in Appendix H.	DWI T. Desai	A note has been added to the bottom of Table 3.2 and in Appendix H.	LaBella H. Miller
T-3	Please discuss seasonal population change and seasonal flow fluctuations during peak summer months to understand high and low flow conditions in Section 2.0.	DWI T. Desai	Section 2.1.7 has been updated to include seasonal flow variations and a table and chart added to appendix D.	LaBella M. Walsh
T-4	Include the information provided in the response for B-7b in Section 3.0 and explain how 230 new lake residents will be connected to the SASS system.	DWI T. Desai	This information has been included as a paragraph in Section 3.2.	LaBella H. Miller
T-5	Table 3.3 Future Flow Analysis on page 48 does not include 230 tier 1 lake residents which are mentioned in the response for comment B-7b. Please include these residents and additional flow in Table 3.1, 3.2 and 3.3.	DWI T. Desai	The future flow analysis does include the 230 Tier 1 lake front residents. Current population is based upon dwelling units, which includes the 230 Tier 1 lake front residents. Therefore, population projections and future flow includes the 230 Tier 1 lake front residents. When the existing subaqueous sewer system (SASS) was designed back in 1927, all lots adjacent to and within close proximity around the lake were included to be served by the SASS. This includes the 230 Tier 1 or lake front residents. This intent is described in what is called the Draper Plan. The map associated with the Draper Plan, showing the area to be served by the SASS, is found in Appendix L. The service intent of the proposed project is to provide sewer service to the very same lots that were initially intended to be served by the SASS. While the initial SASS was designed to accommodate every lot adjacent to and within close proximity around the lake, only 65 manholes were installed for connection points, making it difficult for all (existing and new development) to connect to the SASS without going across other's property. This resulted in many property owners choosing to install septic tanks instead of connecting to the SASS.	LaBella H. Miller

Comment Number	Original Comment	Comment By	Initial Response	Response By
T-6	Table 3.3 does not give the realistic estimate of future flow as this project will be implemented in phases. The flow will be 0.3 MGD after 2024 i.e. completion of phase 1 and it will further reduced due to reduction in I&I in subsequent phases. The Division understands that it is a complicated process to estimate future flow when the scope of other phases is not clear at this stage. We recommend adding a note below Tables 3.2 and 3.3 which says that flow projections prior to 2034 are not valid.	DWI T. Desai	A note has been added to the bottom of Table 3.2 and 3.3.	LaBella H. Miller
T-7	After 2034, there will be negligible I&I. It is important to understand summer and winter flow fluctuations and the highest flow during peak tourist season the plant needs to treat. Indicate when the population will swing up to 10,000 people in summer and include seasonal flow fluctuations in Section 3.0.	DWI T. Desai	Section 3.0 has been updated to discuss seasonal variation and a seasonal variation table has been added to Appendix H.	LaBella M. Walsh
T-8	Please include the information provided in the response for B-7f, B-8o, B-8z in relevant sections in the ER.	DWI T. Desai	The response for B-7f and B-8o can be found in Section 6.3. The response to B-8z can be found in Sections 2.1.1.1 (current) and 6.3 (future).	LaBella H. Miller
T-9	Please note that it is the Division's standard policy that tertiary filters are required for plants using UV disinfection to avoid UV lamp fouling and to avoid reduced system efficiency due to high turbidity in the treated wastewater. We recommend chlorine disinfection for the plant. Please revisit wastewater treatment plant alternatives and update the disinfection option in all relevant sections and tables to reflect this change.	DWI T. Desai	The equipment package from the SRF supplier included a tertiary filter, so the price is already included. The figure 5.5 has been updated to indicate that the filter is included.	LaBella M. Walsh
T-10	Please add a note under Table 8.1 on page 269 to indicate that these are older rates and the Town of Lake Lure has increased them to repay the SRF loan for phase 1 of collection system and WWTP rehabilitation project.	DWI T. Desai	A note has been added underneath Table 8.1.	LaBella H. Miller
T-11	The Division needs another request letter from the town to extend the loan term to 30 years as the one sent in June 2019 which includes previous project cost is no longer valid. The Division will perform cost weighted life cycle analysis for phase 1 of the project and recommend revised loan term.	DWI T. Desai	A letter requesting a 30-year term has been updated and submitted for consideration. It is included in Appendix M.	LaBella M. Walsh Lake Lure S. Baldwin
T-12	Section 8.0 should include the financial analysis for 20 years loan term as well to compare it with 30 years analysis. Please include a discussion on 20 years and 30 years loan term and why the town desires to extend the loan term.	DWI T. Desai	This discussion has been added to Section 8.2 with additional tables added throughout Section 8.0 to compare cost associated with the loan with a 20-year vs. 30-year repayment timeframe.	LaBella H. Miller
E- Environmental Comments				
E-1	See attached comments from the Department of Natural and Cultural Resources. No response to these comments is required. A copy should be added to the ER/EID.	DNCR	A copy has been added to Appendix J.	LaBella H. Miller
E-2	Comments are still pending from the U.S. Fish & Wildlife Service and Department of Environmental Quality review. Any additional comments will be forwarded upon receipt.	DWI	Comments have been received from the North Carolina Resources Commission and the North Carolina Department of Water Resources. Responses to the comments can be found below. Copies of the letters can be found in Appendix J.	LaBella H. Miller

Comment Number	Original Comment	Comment By	Initial Response	Response By
NCWRC - North Carolina Wildlife Resources Commission				
NCWRC-1	During the first phase of work, the subaqueous sanitary sewer system (SASS) would be replaced with gravity flowing sewers that would be placed upland and parallel to more than 19 miles of lake shoreline. Currently, the I&I from the lake into the SASS contributes the majority of flow to the WWTP.	NCRC	The project consists of 6 individual phases. The first phase involves addressing immediate needs at the WWTP, beginning the SASS replacement, and immediate SASS rehabilitation needs. Phase 2 through 5 involve the replacement of the SASS. Table 3.4 provides a timeline for beginning Phases 2 through 5.	LaBella M. Walsh
NCWRC-2	The second phase of work would involve retrofitting the WWTP, which has been operating as a physical-chemical plant due to the high volume of wastewater delivered by the SASS. This plant is incapable of treating ammonia, and it has had chronic problems meeting its permit limits for flow, total suspended solids, and ammonia. As the first phase would address the majority of I&I issues and the excessive flows sent to the WWTP, the WWTP would be rehabilitated into a biological treatment system. The Engineering Report proposes to address the following components: step screen, grit removal system, influent pump station, process train, clarifier, digesters, and chlorine	NCRC	Phase 6 of the project includes the retrofitting of the WWTP to a biological process. This process will address the inefficiencies and inabilities of the plant to meet the NPDES permit limits. Table 3.4 provides a timeline for beginning Phase 6. This engineering report is for Phase 1 of the project only. Subsequent phases will require additional engineering reports.	LaBella M. Walsh
NCWRC-3	Include measures (e.g., flow equalization and offline storage) to ensure consistent effluent water quality and downstream protection from overflows. The WWTP should provide a minimum of five days of storage for untreated or undertreated wastewater. We are concerned about impacts to water quality, aquatic habitat, and aquatic species should treatment upsets occur particularly during low flow periods (e.g., 7Q10 or less). The Environmental Assessment (EA) should include a description of the measures that will be used to store untreated or undertreated wastewater, as well as measures used to ensure consistent effluent water quality and downstream protection from overflows.	NCRC	The proposed layout of the WWTP is conceptual. The wastewater characteristics after the replacement of the SASS is unknowable. The WWTP will continue to take influent samples to build a database that will be used for the final design of the WWTP in Phase 6 of the project. Ten States Standards recommends considering Flow Equalization if the ratio of design peak hourly flow and design average daily flow is greater than 3:1. The future WWTP will be designed in accordance with the applicable regulations and to be compliant with the applicable NPDES limits.	LaBella M. Walsh
NCWRC-4	Develop site-specific acute and chronic water quality standards for ammonia, using the 2013 USEPA's <i>Aquatic Life Ambient Water Quality Criteria for Ammonia-Freshwater</i> .	NCRC	The proposed layout of the WWTP is conceptual. The wastewater characteristics after the replacement of the SASS is unknowable. The WWTP will continue to take influent samples to build a database that will be used for the final design of the WWTP in Phase 6 of the project. The future WWTP will be designed in accordance with the applicable regulations and to be compliant with the applicable NPDES limits.	LaBella M. Walsh
NCWRC-5	Studies have shown PPCP and EDC in municipal effluent can cause adverse physiological effects to fish and freshwater mussels (Bouchard et al. 2009, Bringolf et al. 2010, Farcy et al. 2011, Gagné et al. 2011a, Gagné et al. 2011b, Liney et al. 2011, and Vajda et al. 2001). The WWTP should be designed with technology that is known to reduce or eliminate PPCPs and EDCs from wastewater. Some measures that appear to provide effective reduction or elimination of these emerging contaminants include membrane bioreactors, granular activated carbon, powdered activated carbon, ozonation, and combinations of these treatment technologies. The EA should provide a discussion on emerging contaminants, particularly PPCPs and EDCs, and the treatment measures that will be used in the WWTP to reduce or eliminate these from the effluent.	NCRC	The design of the WWTP is conceptual as the wastewater characteristics after the replacement of the SASS is unknown. The WWTP will continue to take influent samples to build a database that will be used for the final design of the WWTP in Phase 6 of the project. The future WWTP will be designed in accordance with the applicable regulations and to be compliant with the applicable NPDES limits.	LaBella M. Walsh

Comment Number	Original Comment	Comment By	Initial Response	Response By
NCWRC-6	Incorporate a disinfection system using ultraviolet light or ozone instead of chlorine. Chlorine is acutely toxic to aquatic organisms and can form secondary compounds that are detrimental to aquatic life.	NCRC	The current process uses a chlorination and dechlorination process for disinfection. There is not a plan to modify this process prior to Phase 6 of the process. Under current NC requirements, use of UV disinfection also requires a tertiary filter to avoid UV lamp fouling and to avoid reduced system efficiency due to high turbidity in the treated wastewater. The current recommendation of NCDEQ is to continue the current disinfection process. The process recommendations will be revisited during the design process for Phase 6 of the project. The future WWTP will be designed in accordance with the applicable regulations and to be compliant with the applicable NPDES limits.	LaBella M. Walsh
NCDWR - North Carolina Division of Water Resources				
NCDWR-1	Sewer Extension permit(s) will be necessary for the construction and operation of the new sewer lines as well as for any modifications to existing lines. These sewer permits will need to proceed through the full technical review due to the design aspects listed in the proposal, including the review and approval of alternative designs - As described in the documents, specialty design considerations are necessary for the encroachment of the sewer on Lake Lure and related water bodies as well as for the proposed unique alternatives.	NCDWR	Once design is complete for the new sewerlines proposed to be installed with Phase 1 of the project, a Sewer Extension Permit will be applied for.	LaBella H. Miller
NCDWR-2	An Authorization to Construct will be necessary for any proposed alterations to the existing treatment plant.	DNCR	Once design is complete for the rehabilitation projects to be conducted with Phase 1 of the project at the WWTP, an Authorization to Construct will be applied for.	LaBella H. Miller
NCDWR-3	Updates to the current NPDES discharge permit may be necessary at permit renewal, based on the currently proposed changes to the treatment plant. Changes in capacity or overall treatment design/process will require permit revision prior to making the changes.	DNCR	Work to be completed at the WWTP in Phase 1 of the project will not change the capacity of overall treatment design/process.	LaBella H. Miller

Wastewater Collection System Improvements Subaqueous Sanitary Sewer Replacement

Technical Comments

Response to NCDWI Letter dated September 1, 2020

LaBella Commission Number: 2170369

NCDWI Project Number: CS370744-05

Comment Number	Original Comment	Comment By	Initial Response	Response By
A – General Comments				
A-1	Provide a response to all comments on a “Comment for Comment” basis. You can include this as an Appendix in the Revised Engineering Report.	DWI T. Desai	Understood.	LaBella H. Miller
A-2	Submit two hardcopies and one digital copy of the revised report incorporating all changes.	DWI T. Desai	Two hard copies and one digital copy of this report has been provided.	LaBella H. Miller
A-3	The Engineering Report shows that the Town of Lake Lure will have to double the sewer rate to pay for Phase 1 of this project. This is a tremendous increase that the customers need to be informed of. Therefore, the Division requires the town hold a public meeting to explain the project including short, medium and long term improvements and their impact on sewer rates to its citizens. This meeting should be held after the Division concurs with the revised ER and before the ER is approved. Please submit minutes from the meeting to the Division for review and include them in Section 9 in the final ER.	DWI T. Desai	The Town of Lake Lure engaged Withers Ravenel to perform a financial audit and determine the timing and magnitude of the necessary rate increases. The rates were increased by 30% for FY2020 and will cover the debt service of the initial SRF loan based on a thirty-year term, 0% rate, and \$500k in principal forgiveness.	LaBella M. Walsh
A-4	The Division recommends the Town contact LGC directly to discuss the Phase 1 project cost to determine if this size of debt is possible.	DWI T. Desai	Understood.	LaBella H. Miller
B – Engineering Report				
B-5	Section 1.0 Executive Summary: Do not include entire Section 6.0 in the Section 1.1. Provide summary only. Please see the comments below and edit this section to provide summary of important facts about the project	DWI T. Desai	This section has been revised to provide only a summary.	LaBella H. Miller
B-5a	Section 1.1 should provide a brief description of the location and vicinity of the project, overview of wastewater collection system and treatment plant and then a short description of components of the proposed project.	DWI T. Desai	This section has been revised.	LaBella H. Miller
B-5b	Update Figure 1.1 to show Rutherford County and nearby towns.	DWI T. Desai	This figure has been updated	LaBella M. Walsh
B-5c	Summarize Section 1.2.	DWI T. Desai	This section has been summarized.	LaBella H. Miller
B-5d	Format Section 1.3 to provide summary of alternatives in separate paragraphs.	DWI T. Desai	The alternates have been represented in separate paragraphs.	LaBella H. Miller
B-5e	Manhole Rehabilitation is not a standalone alternative considering the objective of this project stated in the funding application. It is one of the components of proposed alternatives. Please remove it from the list of alternatives and update all relevant sections and present worth analysis.	DWI T. Desai	The Manhole Rehabilitation Alternative has been removed from the ER.	LaBella H. Miller
B-5f	Put preferred alternative in parenthesis besides Backshore Gravity/Lift Station in Section 1.3.	DWI T. Desai	Preferred Alternative has been placed in parenthesis behind the preferred alternative.	LaBella H. Miller
B-5g	Section 1.3 on page 8 shows some information on Phase 1 of the project. Add a subsection with a title to provide this information.	DWI T. Desai	A subsection has been added above the paragraphs that discuss Phase 1 of the project.	LaBella H. Miller

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B-5h	See comment 7.g and add a summary of subsequent phases with a tentative schedule of the project in Section 1.3.	DWI T. Desai	A summary of future phases, including estimated timeframes, is included in new Section 1.3.2.	LaBella H. Miller
B-5i	Please make it clear that the sewer access valve is proposed for all alternatives (except for no action) in Section 1.3.	DWI T. Desai	Additional wording has been added to make clear the sewer access have is proposed for all alternatives except the no action.	LaBella H. Miller
B-5j	Please rewrite Section 1.5 using the Division's guidance for the ER. Please note that this Section must provide information on current sewer bill to understand the rate increase due to project.	DWI T. Desai	This section has been re-written to follow the Division's ER guidance.	LaBella H. Miller
B-5k	Add a paragraph in Section 1.5 to discuss how future phases will be financed.	DWI T. Desai	A new Section 1.6 has been included to discuss how future phases are expected to be financed.	LaBella H. Miller
B-6	Section 2.0 Current Situation			
B-6a	Section 2.0 needs to simply describe the existing collection system and the wastewater treatment plant with all issues without referencing the proposed SASS solution. Please remove discussion of the proposed system in this section.	DWI T. Desai	Discussion of the proposed project has been removed from this section.	LaBella H. Miller
B-6b	Provide information on the number of households connected to the existing centralized wastewater collection and treatment system and those using a septic tank system within the Lake Lure town limits or ETJ. We note that the previously submitted ER (Brown Consultants, March 2019) contained a detailed land parcel map of Lake Lure showing sewer and unsewered individual lots. We recommend including such a map into this ER.	DWI T. Desai	There are currently 926 residential connections and 106 commercial connections for a total of 1,032 connections. It is assumed that all existing structures that are not on the SASS are on septic tanks. There are 230 residences with septic tanks that are lake front and an additional 215 residences with septic tanks that are off the lake but within the sewer shed. This amounts to a total potential users of 1,477. A map of the sewer and unsewered in the sewer shed and in Phase 1 is included in Figure 2.3 and 2.3A.	LaBella M. Walsh TOLL M. Anderson
B-6c	Discuss the Town of Lake Lure's policy on mandatory connection to the sewerage system.	DWI T. Desai	The Town of Lake Lure has been in discussions with the North Carolina School of Government, Environmental Finance Center for recommendations on short and long term connection policy. Based on EFCs guidance and internal discussions, the TOLL will implement availability charges and development charges as the new sewer service becomes available to users, which are not currently connected. Those users will be given a timeline for mandatory connection following the completion of each phase.	LaBella M. Walsh
B-6d	Discuss sewer permits and low pressure collection system of Sunset Cove and Fisher Court HOAs in Section 2.1.1.1.	DWI T. Desai	The GLS will incorporate the discharge points of the connecting systems. Users on directly adjacent will have a lateral installed by which they may directly connect the the GLS. The low pressure sewer systems are currently connected to the SASS, as such will be incorporated into the GLS. We have been told that the HOAs are considering disbanding once the GLS is installed.	LaBella M. Walsh
B-6e	What leads to SSOs at the influent pump station and WWTP headworks? Will Phase 1 of the proposed project solve this issue?	DWI T. Desai	The Influent Pump Station is the location of the SSOs. The cause apart from mechanical or electrical failure is directly attributed to the lake infiltration and I&I to comes into the system from connecting land based systems. Phase 1 will reduce the lake infiltration by the rehabilitation of the existing manholes, removal of users from the SASS, and by the ultimate abandonment of a portion of the SASS. The removal of Lake Infiltration will increase the available capacity of the influent pump station, thus increasing it's ability to meet it's hydraulic demand and reduce the risk of SSOs.	LaBella M. Walsh

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B-6f	According to page 15, I&I from the lake is estimated at 0.43 MGD whereas page 24 mentions 0.4 MGD. Please correct this discrepancy throughout the report.	DWI T. Desai	This discrepancy has been corrected throughout the ER.	LaBella H. Miller
B-6g	Edit Figure 2.4 to show arrows pointing towards existing bar screen, flash mix, flocculation and sedimentation basins and pump station.	DWI T. Desai	Map has been updated	LaBella M. Walsh
B-6h	Add a figure to show the location of influent pump station in close proximity to Lake Lure Dam.	DWI T. Desai	Figure 2.5 has been changed to show the pump station and dam	LaBella M. Walsh
B-6i	Please remove Figure 2.4 or 2.5 if they are showing the same information.	DWI T. Desai	Figure 2.5 has been changed, see B-6h.	LaBella H. Miller
B-6j	Is there a bypass screen at the plant? Table 2.9.1 on page 31 does not clarify if the plant has one or two screens.	DWI T. Desai	The plant has only one screen, there is a line bypass but it is not screened. The table has been updated.	LaBella M. Walsh
B-6k	Update Table 2.7 on page 26 to show 2019 and 2020 average daily flow.	DWI T. Desai	Table has been updated	LaBella M. Walsh
B-6l	Review Division's guidance for ER and add a section on current population with tables in this section. (See comment 7.a below).	DWI T. Desai	A section on current population, including tables, can be found in Section 2.1.6.	LaBella H. Miller
B-7	Section 3.0 Future Situation			
B-7a	Future growth of the service area should include the population of Lake Lure, Chimney Rock area, Rambling Bald area, Seasonal Population, the Extraterrestrial Jurisdiction (ETJ) area, and town's future plans to add connections from unsewered areas to the proposed sewer system. Update all population projection tables using this methodology and use it to provide current population data in Section 2 Current Situation.	DWI T. Desai	The population of Lake Lure, Chimney Rock Village, Rumbling Bald Resort is included in the current population calculation found in Section 2.1.6 and is used to determine future population within the sewershed area. Seasonal population is added into the future population. There is no ETJ area associated with Lake Lure. Section 3.1 provides population projections.	LaBella M. Walsh H. Miller
B-7b	Using map discussed in comment 8.a, please identify which unsewered lots could be connected to the proposed SASS.	DWI T. Desai	There are approximately 230 existing structures located on the lake and an additional 215 structures that are located within the existing sewer shed. These structures and not currently connected to the existing sewer system, so they are assumed to be on septic. The 230 tier 1 or lake front residences would be required to connect to the new sewer system as it becomes available. The additional 215 residences may but would not be required to connect to the new sewer system. The sewer and septic parcels are shown in the included map for phase 1 and the lake as a whole.	LaBella M. Walsh TOLL M. Anderson
B-7c	Move Table 3.1 from Appendix I to this section and prepare Table 3.2 showing flow projection. (See Division's guidance to prepare ER).	DWI T. Desai	Table 3.1 has been moved to Section 3.0 from Appendix I and Table 3.2 has been added.	LaBella H. Miller
B-7d	Review Table 3.1 on page 35 and confirm the capacity of WWTP Gravity Sewer.	DWI T. Desai	This rehabilitation and replacement table, Table 3.1 "Future Flow", has been removed and replaced with the expansion table, Table 3.1 "Future Population Analysis" as requested by DWI staff.	LaBella H. Miller
B-7e	The last sentence in Table 3.1 on page 35 which mentions that "The future peak flow is 0 gpd" is misleading and should be removed.	DWI T. Desai	This rehabilitation and replacement table, Table 3.1 "Future Flow", has been removed and replaced with the expansion table, Table 3.1 "Future Population Analysis" as requested by DWI staff.	LaBella H. Miller

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B-7f	Explain how Phase 1 will solve collection system and WWTP issues? Also discuss issues which will not be solved by Phase 1 project.	DWI T. Desai	Phase 1 will consist of 4 parts that will be bid as four separate projects. These are the sewer access valve, manhole rehabilitation, wastewater treatment plant rehabilitation, and SASS replacement. The sewer access valve will provide access to the construction area and access to the proposed alternative once it is installed. The manhole rehabilitation will eliminate the observed high level lake infiltration and prevent further deterioration of the manholes while the future SASS replacement phases are funded and executed. The wastewater treatment plant rehabilitation will address the immediate solids handling needs and chemical performance issues. The primary issue with the SASS is lake infiltration and remaining service life. Phase 1 will address part of the infiltration through the manhole rehabilitation and begin the SASS replacement. The issues at the WWTP deal primarily with lake infiltration, but also with an inadequate solids handling process due to the structural deficiencies in the existing digester and high levels of influent TSS that results from pipe degradation and silt and sediment entering the system. Phase 1 will replace the deficient digester and install a grit removal system to remove the sand and silt prior to entering the sedimentation basin. The flow reduction from the manhole rehabilitation will assist with hydraulic retention times and maintaining the NPDES permitted flow during the SASS replacement. The available funds are not sufficient to replace the entire SASS and fully rehabilitate the WWTP, as such Phase 1 will only partially solve the SASS and WWTP issues. However, it will establish the method for both and serve as a model for future phases.	LaBella M. Walsh
B-7g	When will the town undertake Phase 2 of the project? Discuss Phase 2 and 3 (or Medium and Long Term project scope) of the project with more clarity in terms of timing, funds, proposed rehabilitation etc.	DWI T. Desai	A table listing the future phases, including estimated timeframes, is included in new Section 3.4. A phase map is also included as Figure 3.1.	LaBella M. Walsh
B-7h	Please estimate the amount of I&I reduction expected to occur after Phase I implementation.	DWI T. Desai	The current annualized average daily for 2020 at the WWTP was 0.5393 MGD. Based on a flow analysis when compared to lake elevation our target for ADF is 0.300 MGD, which is a reduction of approximately 240,000 GPD.	LaBella M. Walsh
B-8	Section 5.0 Alternative Analysis			
B-8a	Revise Figure 5.3 to include:			
B-8a.i	The proposed sewer layout through the dam area and the treatment plant.	DWI T. Desai	Figure has been revised	LaBella M. Walsh
B-8a.ii	Influent pump station to be bypassed and abandoned/demolished.	DWI T. Desai	Figure has been revised	LaBella M. Walsh

Comment Number	Original Comment	Comment By	Initial Response	Response By
B-8b	<p>We recommend adding another detailed figure specifically to show the dam and sewer routed through the dam. Make sure to include plan and section view. Please discuss special engineering considerations to be taken into account for this pipe to be penetrated through the dam.</p>	<p>DWI T. Desai</p>	<p>LaBella is not performing any design services relative to the dam. Schnabel Engineering, Inc is providing the design, permitting, bidding, and construction observation of the sewer access valve and utility sleeve. This part of the project will be permitted through NC DEQ-Dam Safety and other applicable regulatory agencies. A utility sleeve will be constructed in conjunction with the sewer access valve that the Phase 1 contractor will push a pipe through during the construction phase. A figure is provided showing the approximate location of the dam penetration on the south side of the dam to connect the proposed sewer system to the existing gravity sewer behind the dam. As the figure indicates, the penetration is taking place in a short section of the dam at the second bay on the south side. This particular location was chosen due to the proximity of the connecting sewer behind the dam and as this location poses much less critical design considerations. The structural integrity and water tightness of the dam is the primary concern. This work will be performed along with the sewer access valve by a contractor with relevant experience.</p>	<p>LaBella M. Walsh</p>
B-8c	<p>We understand that the sewer collecting the WW from north and south shoreline will pass through the Dam and then to the WWTP. Please discuss how this project activity will coincide with the dam project which is also one of the priorities of the town.</p>	<p>DWI T. Desai</p>	<p>The sewer project will take place prior to the dam project, which is still in a conceptual phase. At the time of the dam project phase 1 will certainly be completed, and additional phases may also be completed. The sewer penetrations will be handled as existing and incorporated into the design and phasing of the dam by the consulting engineer. This work will be designed and constructed in such a way that the GLS service will not be disrupted. LaBella will coordinate with the dam engineer during the final design of the SASS replacement to incorporate any recommendations that they might have.</p>	<p>LaBella M. Walsh</p>
B-8d	<p>There is a discrepancy on total length of sewer running along north and south shorelines of Lake Lure in Phase 1. As per the description of the project given on page 44, the total length of sewer is 9000 LF but Table 5.1.2 mentions 15,400 LF. Please review this information and correct it throughout the report. Also note that 2300 LF of 16" gravity sewer proposed in Phase 1 does not match with the cost estimate (Table 2.5.91) for this phase on page 166.</p>	<p>DWI T. Desai</p>	<p>The intent of the statement referencing the total length of sewer to be installed, "runs along the north and south shorelines for approximately 9,000 LF" was to imply that this length of pipe is along both shorelines. This statement has been revised in the description before Table 5.1.2 to make this statement more clear and provide an accurate total length that is consistent throughout the ER. 15,400 LF of pipe references only the 14" sewer pipe and has been revised to a more accurate length such that when added to a revised length of 16" sewer pipe the total sewer pipe is consistent. The pipe lengths described in Table 5.2.1 are the totals for the entire proposed project. These pipe lengths can be found in the cost estimate shown in Table 5.2.1. Table 5.2.91 is for Phase 1 only.</p>	<p>LaBella H. Miller</p>
B-8e	<p>Provide more details on how proposed 15000+LF of HDPE pipe connects to the existing sewer system in Phase 1. Include maps to show these details.</p>	<p>DWI T. Desai</p>	<p>The proposed GLS connects to the existing gravity sewer system behind the dam. A map has been included to demonstrate this.</p>	<p>LaBella M. Walsh</p>

Comment Number	Original Comment	Comment By	Initial Response	Response By
B-8f	Provide the source of the peak flow equation mentioned on page 44. Is this equation applied to lift stations only or entire WW collection system. Please explain.	DWI T. Desai	The equation $3.5Q_a^{0.807}$ was used for all of the gravity sewer peaking values. It was chosen this because it is very conservative, varying from a peaking factor of 8.5 at a 10,000 gpd average flow, to about a 4.4 factor at a 300,000 gpd average flow. As a comparison, NCDEQ's requirement (sewers shall be designed flowing half full at the average daily flow) essentially gives a sewer capacity designed for a 2.0 peaking factor, regardless of average design flow. If applying NCDEQ's criteria against the sewer design, the sewer could handle flows many times that for which it is being designed for. This equation for sewer peaking factor is also used for the lift stations as they are just part of the gravity flowing system and the stations need to keep up with the flow coming into them, so that the upstream sewer do not surcharge. This is another conservative approach.	LaBella B. Houston
B-8g	Provide a separate figure showing proposed rehabilitation of existing manholes, new HDPE sewer and new manholes in Phase 1.	DWI T. Desai	Figures have been added to the ER	
B-8h	Provide phasewise description of preferred alternative which should match with the description provided in Section 3.0 (See comment 7.g).	DWI T. Desai	The description of phases has been added to the preferred alternates for both the SASS preferred alternate and the WWTP preferred alternate.	LaBella H. Miller
B-8i	Please cross check the number manholes to be rehabilitated in Phase 1, 2 and 3 throughout the ER and appendices to ensure consistency in the whole report.	DWI T. Desai	All of the manholes will be rehabilitated in Phase 1 of the project, this has been generalized throughout the document	LaBella M. Walsh
B-8j	Because of the innovative nature of the proposed SASS collection and transmission system following items should be included in the ER which are normally included in plan and specifications:			
B-8j.i	Provide preliminary sewer elevation cross sections of 19+ mile long proposed SASS HDPE pipes and manhole/lift stations from north and south shorelines to the treatment plant.	DWI T. Desai	Preliminary sewer plans and profiles for Phase 1 provided in Appendix K.	LaBella B. Houston
B-8j.ii	Provide at a minimum preliminary hydraulic calculations which show how this 19+ mile long SASS pipes will work under low, design and peak flow conditions.	DWI T. Desai	Preliminary hydraulic calculations for Phase 1 provided in Appendix K.	LaBella B. Houston
B-8j.iii	Provide items listed above (8.j.i and 8.j.ii) for Phase 1 as well. They need to show how the existing collection system transitions into new HDPE pipe.	DWI T. Desai	See answers for items 8.j.i and 8.j.ii above. The existing sewer system or SASS will be eventually abandoned and does not transition into the new system. The SASS and recommended alternative will exist as parallel systems until the entire project is complete.	LaBella M. Walsh

Comment Number	Original Comment	Comment By	Initial Response	Response By
B-8k	The unit cost of pipes is different in the cost estimate for various alternatives including preferred alternative. Please check page 94 and 102 and correct cost estimates and related tables throughout the ER.	DWI T. Desai	<p>The costs for different sizes are different for the alternatives because the character for the same size pipe would be different for different alternatives. For example, in the GLS alternative, there is around 40,000 linear feet of 8-inch gravity sewer, and most of that is in the upper reaches of the system, where there may not be as many narrow or rocky corridor areas. In the Backshore Pump Stations alternative, there is nearly 86,000 linear feet of 8-inch, so it is almost everywhere, and therefore much more subject to complicated corridor conditions.</p> <p>In the Backshore Pump Stations alternative, the force main is priced as an 'add-on', assuming that the gravity sewer installation has borne the cost of the shoreline character. The force main is likely to be placed essentially the same trench, and there are no connections to it except at pump stations, so it should be much less expensive per foot.</p> <p>We could 'normalize' the pipe pricing by eliminating factor #3 above from our estimate, but that would seem to be over-simplifying in this case.</p> <p>The cost estimates for the pipes in Lake Lure were calculated PER SEGMENT (i.e., manhole-to-manhole) and each segment's price was influenced by three factors:</p> <ol style="list-style-type: none"> 1) Materials (minimal component, driven by line size) 2) Base Labor (driven by line size, based on cost of installation in wide open corridor & sandy soils) 3) Shoreline Character (multiplier on labor only) <p>After calculating the cost per segment, they are added up and the average cost per linear foot for each size pipe is calculated and entered into the ER spreadsheet template.</p>	LaBella B. Houston
B-8l	Section 5.1.3.1 and Table 5.1.7 on page 66 and 67 respectively mention that the chlorine contact chamber will be rehabilitated but the cost estimate for this alternative shows UV disinfection on page 131. Please clarify if the project proposes rehabilitation of existing chlorine contact chamber or installation of new UV disinfection system.	DWI T. Desai	The SBR process that was preliminarily designed for this site includes UV disinfection in lieu of using the existing chlorine contact. The relevant sections have been updated to reflect this.	LaBella M. Walsh
B-8m	Please confirm that the equipment installation in the cost estimate for SBR alternative on page 131 is for SBR system only or for all proposed equipment.	DWI T. Desai	Confirmed, the equipment installation is for the SBR equipment package.	LaBella M. Walsh
B-8n	Provide separate cost estimate for digestors, post equalization tank, SBR tanks on page 131.	DWI T. Desai	Cost Estimate has been separated	LaBella M. Walsh
B-8o	What is included in rehabilitation of existing structures in the cost estimate for MBBR and IFAS alternative on page 139 and 147? If it does not include rehabilitation of chlorine contact basin, please add a new line item for this component.	DWI T. Desai	The rehabilitation of existing structures includes the concrete rehabilitation of the headworks, submersible pump station, and chlorine contact basin.	LaBella M. Walsh

Comment Number	Original Comment	Comment By	Initial Response	Response By
B-8p	Why MBBR and IFAS alternatives require 3 trains? As per the Division's minimum design criteria, two trains are recommended for redundancy.	DWI T. Desai	This is for construction sequencing, to provide treatment during the demolition and replacement of the existing sedimentation basin. The basin size of the MBBR and IFAS are sized as such that it is more cost effective to build a third permanent basin then use a temporary plant as the SBR approach requires.	LaBella M. Walsh
B-8q	The description of the complete project and Phase 1 from page 79 to 87 is not required as this information is presented in the previous section. Do not remove Figure 5.8 showing Phase I project for the rehabilitation of WWTP and cost estimates for the entire project and Phase 1.	DWI T. Desai	The description of the complete project and Phase 1 alternates have been removed, Figure 5.8 has been renamed Figure 5.7a and Figure 5.3a has been added to show Phase 1 of the preferred SASS alternate.	LaBella H. Miller
B-8r	Remove pages 91 to 93 in Section 5.2 as this information is already presented in Section 5.1.	DWI T. Desai	Section 5.2 (Pages 91 through 93) is the Alternatives Analysis Summary, a summarization of Section 5.1 and is required per the Engineering Report Guidance.	LaBella H. Miller
B-8s	Capital cost estimates for all alternatives are missing the cost of sewer access valve. Please include this cost component in all relevant tables in Section 5.2 including project cost life cycle assumptions, replacement costs, O&M etc.	DWI T. Desai	The sewer access valve has been added to all cost estimates for all SASS alternates as well as project cost life cycle, replacement costs, O&M costs, etc...	LaBella H. Miller
B-8t	O&M cost analysis must include inspection and cleaning of manhole and sewer system every couple of years (Recommended every 1-3 years) for Backshore Gravity/Lift Station and Backshore Pump Stations alternatives. We note that this SASS system will be permitted as an innovative sewer collection and transmission system and likely to be designated as high priority line with annual inspections.	DWI T. Desai	Inspection and cleaning of manholes and the sewer system every year has been added to the Backshore Gravity/Lift Station and Backshore Pump Station alternatives.	LaBella H. Miller
B-8u	Table 5.2.21 on page 110 includes sewer access valve in capital cost with an expected life cycle of 10 years in Table 5.2.22. Please explain why the replacement cost of this valve at the end of 10 and 20 years is \$833 when its unit cost in Table 5.2.21 is \$2,173,913.	DWI T. Desai	The replacement cost of this item has been revised.	LaBella H. Miller
B-8v	See comment 8.i and update relevant tables in Section 5.3.3 if existing chlorine contact chamber is to be rehabilitated.	DWI T. Desai	The chlorine contact chamber rehabilitation is included in the "Rehabilitate Existing Structures" line item.	LaBella M. Walsh
B-8w	Add blowers in project life cycle cost assumptions and other tables in the present worth analysis of relevant alternatives.	DWI T. Desai	Blowers have been added to the life cycle cost	LaBella M. Walsh
B-8x	Based on the Division's experience of working on similar projects, we recommend 40 to 50 years expected life for wastewater treatment plant yard and air piping. Please update relevant tables for all alternatives in Section 5.3.3.	DWI T. Desai	The expected life cycle of the WWTP yard and air piping has been revised to 50 years in all relevant tables.	LaBella H. Miller
B-8y	Please explain what is included in "Additional O&M cost" in Table 5.2.57 on page 137 and similar table for other alternatives.	DWI T. Desai	The "additional O&M Cost" includes cost related to administrative cost, utilities, chemical, and personnel cost. These cost are based on a Technical Report published by the EPA titled "Operation and Maintenance Cost for Municipal Wastewater Facilities". The cost have been inflated at 3% to present.	LaBella M. Walsh

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B-8z	Please discuss current and future sludge handling practice at the WWTP.	DWI T. Desai	The current sludge handling process is to hire septic haulers to remove sludge from the digesters and haul to a disposal site. The sludge is removed as needed at the determination of the ORC. The sludge handling following phase 1 will consist of transferring sludge to the new digester. The digester will be able to be mixed, aerated, and decant to thicken the sludge. The thickened sludge can be hauled wet to a disposal site, or a mobile belt press used to dewater the sludge and then the cake will be disposed off. The option of wet or dry disposal will be at the discretion of the ORC and based on factors such as need, cost, and disposal options.	LaBella M. Walsh
B-8aa	Table 5.2.81 (page 156):			
B-8aa.i	Please confirm if rehabilitation of disinfection system is included in the cost estimate.	DWI T. Desai	Confirmed. The rehabilitation of the disinfection system is included in the cost estimate in the Rehabilitate Existing Structures item for the MMBR and IFAS alternatives. The chlorine contact chamber will not be rehabilitated in the SBR alternative.	LaBella M. Walsh
B-8aa.ii	Please explain why does this project propose to install 7200 laterals whereas total number of connections are around 1200. Does it imply that the town will add new connections to the sewerage system as Phase 1 proposes 1200 laterals for existing customers.	DWI T. Desai	There are not 7,200 laterals. There are 7,200 LF of laterals, accounting for (360) 20-foot long (average) laterals, at \$188/lf of lateral. Each lateral serves two lakefront parcels, of which there are 720.	LaBella M. Walsh
B-8aa.iii	Demolition/Abandonment of influent pump station and associated pipe coming out the dam is not included in the capital cost estimate.	DWI T. Desai	The pump station will be abandoned in place. The piping under the dam will be capped and abandoned in place as well. A line item has been added to the alternatives to reflect this.	LaBella M. Walsh
B-8bb	Does LaBella Associates have previous experience of designing, construction, operation and maintenance of IFAS process for the WWTP? Please provide name of those plants and plant performance details in your response only. Do not include this information in the ER.	DWI T. Desai	LaBella has much experience with biological processes, some of which involves media based process. This particular process is relatively new and has numerous benefits in terms of retrofitting existing plants and O&M. To date LaBella has not installed a system such as this, although employee's have designed similar systems for previous firms.	LaBella M. Walsh
B-9a	Section 6.0 Proposed Project Description: This section should really focus on the complete description of Phase 1 with only future reference to subsequent phases.	DWI T. Desai	This section has been revised to only discuss Phase 1 of the project.	LaBella H. Miller
B-9a	The information provided in this section should match with previous sections. For example, this section mentions that around 9000 LF sewer will be installed in Phase 1 which is not matching with the information provided in alternative analysis.	DWI T. Desai	The information in this section has been revised to match the information found in the alternatives analysis section.	LaBella H. Miller
B-9b	Create subsection with appropriate titles to organize the information provided in this section.	DWI T. Desai	Subsection titles have been added.	LaBella H. Miller
B-9c	Provide the clear description of proposed activities in Phase 1 with only very brief description of subsequent phases.	DWI T. Desai	Phase 1 has been described. No mention to subsequent phases was added for clarity.	LaBella H. Miller
B-10	Section 8.0 Financial Analysis:			
B-10a	Water and sewer rates shown on page 251 are different from those presented on the town's website. Please correct these rates and financial analysis. Also correct other sections which show these numbers.	DWI T. Desai	The rates shown on page 251 are the rates prior to an increase in anticipation of the debt service from the SRF loan related to this ER-EID.	LaBella M. Walsh

Comment Number	Original Comment	Comment By	Initial Response	Response By
B-10b	The Division had a discussion with the town and previous consultant on 30 years loan term for this project. Is the town still interested in increasing the loan term? Contact the Division if the town wishes to submit a request to increase the loan term.	DWI T. Desai	The Town wishes for a 30 year term, a request has been submitted to the Division to increase the loan term.	LaBella M. Walsh
B-10c	We understand that WithersRavenel is working on long term financial study on Lake Lure infrastructure projects. Please include highlights/summary of this study with emphasis on the town's plans to finance future phases of this project.	DWI T. Desai	Section 8.5 has been added to discuss the financing of future phases.	LaBella M. Walsh
B-11	Appendices:			
B-11a	It appears that Collection and Treatment Systems Evaluation Report is presented more than once in several appendices. Please provide this report in Appendix B or C and provide its reference in other appendices to avoid repetition.	DWI T. Desai	The report can be found in Appendix B with references to it in subsequent appendices.	LaBella H. Miller
B-11b	Provide an explanation for the estimated high BOD and TSS concentration in the influent shown on page 11 of Collection and Treatment Systems Evaluation Report. These numbers are higher than typical concentration of these parameters in domestic wastewater as the I&I flow is reduced. The Division also need to understand these numbers and description provided on page 12.	DWI T. Desai	These values were determined as an estimate of the average characteristics as the I&I is reduced. This was accomplished by taking the composite influent samples of the BOD and TSS. It should be noted that this was begun on April 21, 2020 and is not available prior to that. The average pounds per day were calculated and held constant as the flow was reduced and a resulting concentration estimated. Typical Wastewater Influent strength is around 200-250 ppm for BOD and 250-350 ppm for TSS. The projected BOD is a little lower than this, but the TSS is much higher. This reflects the amount of typical wastewater solids plus the corrosion byproduct from the cast iron pipe and silt and sediment that routinely washes into the pipe from the lake. Phase 1 includes a grit removal system for this particular reason. The solids handling would be improved by removing the inorganic solids prior to entering the sediment basin. The reference report was produced as part of an SOC negotiation and is attempting to set the limits as such. The SOC would govern the limits of the wastewater treatment plant during the construction project. The SASS replacement would eliminate the corrosion product and the source of silt and sediment. The biological plant would be designed for wastewater with more typical characteristics.	LaBella M. Walsh
B-11c	Appendix D:			
B-11c.i	Include available Chimney Rock Village and Rumbling Bald Resort flow monitoring data summary and analysis in Appendix D.	DWI T. Desai	The available information has been included in Appendix D.	LaBella M. Walsh
B-11c.ii	For better understanding of the flow monitoring data, we recommend providing charts showing flow variation and trends.	DWI T. Desai	Flow charts have been included in Appendix D.	LaBella M. Walsh
B-11d	The SOC application is provided again in Appendix E. Please avoid repeating information.	DWI T. Desai	The report can be found in Appendix C with references to it in this appendix.	LaBella H. Miller
B-11e	Appendix H:			
B-11e.i	Please explain if this appendix is presenting the future flow situation after Phase 1 or after completion of the whole project?	DWI T. Desai	The documentation shown in Appendix H has been revised and shows the future flow situation after completion of the entire project as the flow to the WWTP will remain the same during all phases of the project.	LaBella H. Miller

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B-11e.ii	Appendix reference shown in tables presenting Total Flow Received by the Plant in Appendix H is incorrect. It should be Appendix I instead of Appendix G.	DWI T. Desai	These references have been revised.	LaBella H. Miller
B-11e3	The information presented on page 1 of Appendix H contradicts flow information presented in the report and Appendix H itself. The wastewater flow to the WWTP excluding I&I after 20 years is 148,998 GPD (See tables showing total flows from users only) but as per this appendix 180,000 GPD and 228,00 GPD flow will be coming from south and north shorelines. Please provide explanation for this discrepancy.	DWI T. Desai	The design flow data has been moved to Appendix K, as it reflects values used to size the pipe and is not reflected of the population based flow estimates. This flow from the sewer system is a preliminary design value that includes conservative flow estimates and peaking factors (See B-11e4 and B-11e7). Further, the ERCs take into account any possible user that could connect to the system within its estimated 100 yr service life. This approach is more reflective of the long-life assets being used for its construction and from a desire to avoid required capacity upgrades during its useful service life. This time frame exceeds that of the WWTP by greater than a factor of 5. The flow to the WWTP is based on population growth estimates for 20 years and assumes the SASS has been replaced, with the resulting reduction in Lake Infiltration.	LaBella M. Walsh
B-11e4	Provide the reference for the flow assumption of 400 GPD/ERC. We note that according to 15A NCAC 02T.0114, the WW flow rate for a typical 3 bedroom household is 360 GPD.	DWI T. Desai	400 gpd/erc was used simply to be conservative.	LaBella B. Houston
B-11e5	Please explain how did you arrive at 450 ERCs along the South Shoreline and 570 ERCs along North Shoreline. Please compare these ERC numbers with actual number of physical sewer connections along these shorelines. We also recommend adding the map mentioned in 8.a to find this correlation	DWI T. Desai	The 450 ERC along the south shoreline and 570 ERC along the north shoreline was based on lot counts, plus backed-in Equivalent lot counts for Rumbling Bald (coming into the North Shore system) and Chimney Rock Village (coming into the South Shore system).	LaBella B. Houston
B-11e6	Lift station pumping capacities showed on the first page of Appendix H includes I&I with the wastewater. We understand that I&I issues will significantly be reduced due to this project. Provide explanation for oversized lift stations.	DWI T. Desai	I&I from Chimney Rock Village and Rumbling Bald will not be remedied by any Town of Lake Lure project. The Town will be taking measures to attempt to enforce reduction of I&I contributed by those customers, but we can't guarantee the effectiveness of those measures.	LaBella B. Houston
B-11e7	Page 44 of the ER describes the lift stations being designed using the equation $Q_p = 3.5Q_a^{0.807}$ (Where unit for both Q is MGD), whereas Appendix H uses population equation for peaking factor calculations. Please clarify.	DWI T. Desai	The PF = $3.5Q_a^{0.807}$ formula has been used for the G/LS system and the calculation of the peaking factor using this formula has been included in Appendix H.	LaBella B. Houston
B-11e8	Since the population of Lake Lure is not going to change much in next 20 years, we recommend using just one peaking factor of 3.7 for future flow analysis in Appendix H.	DWI T. Desai	A peaking factor of 3.7 has been used for the future flow analysis in Appendix H.	LaBella H. Miller
B-11e9	Please note that the future flow projection presented in this appendix should match with the flow projection in Table 3.2.	DWI T. Desai	The flow projections will match those in table 3.2.	LaBella H. Miller
B-11e10	The flow projection shown in 5 tables under "Total Flow Received by the Plant" does not provide the actual future flow to the plant after Phase 1 assuming that it will reduce I&I from the lake. We recommend removing these tables from the appendix.	DWI T. Desai	These five (5) tables have been removed from the Appendix.	LaBella H. Miller
B-11f	Move Table 3.1 from Appendix I to Section 3.0.	DWI T. Desai	This table has been moved to Section 3.0	LaBella H. Miller

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C- Environmental Comments				
C-12	General Comments: The ER/EID mentions in several places that this will be a phased project, but it's not clear when future phases will be implemented or what they will include. It is our understanding that construction of Phase 1 is intended to be a stand-alone project and that future phases of the project are not anticipated for several years, but this information needs to be explained in the ER/EID when project phasing is mentioned to make it clear that the environmental review is for Phase 1 only and that future phases, if ultimately constructed, will undergo another environmental review.	DWI S. Kubacki	The phasing schedule has been included in the ER-EID in Sections 1.3.2 and 3.4 along with a statement that additional environmental reviews will be needed for future phases.	LaBella H. Miller
C-12a			The GLS is in general designed to replace the SASS and is installed around the perimeter of the lake in lieu of being along the bottom of the lake. Due to its location, there will be existing septic users which did not previously have easy access to a sewer collection system. In addition, users with access will be required to ultimately connect to the new system once it is in place. All phases of the GLS will provide connection points for these users that are out of the lake in the form of laterals or land based manholes. Future connections to the system will occur out of the lake. In the phase 1 area there are 62 existing users and 76 septic users and 15 undeveloped parcels which are lake front. Figure 2.3A shows the sewer and unsewered parcels in Phase 1. The septic users would be charged an availability fee and encouraged to abandon their existing septic system and connect to the new collection system. It should be noted that these users are in the existing sewer shed, but due to the difficulty of connecting to the SASS the owners choose to build a septic system. Given the soil and topography of the area and the known issues with the older septic systems, it would be an environmental benefit to remove them from service. These users would connect their existing lateral to a new lateral installed on their property above the water line. Figure 2.3A shows the limits of the design sewer shed, which is used in sizing the proposed infrastructures. It is possible that existing users which are not on the lake could make arrangements between private property owners to run laterals to the new system, however Phase 1 does not extend out of the lake to properties beyond those that border the lake.	LaBella M. Walsh
C-12b	Throughout the EID section, discussions of SCI mention new development, but there is not much detail provided for impacts and mitigation related to future growth. If the project is intended to support growth and development, then additional detail must be provided to describe the nature of impacts and mitigative measures that will be associated with future growth. If Phase 1 alone does not expand capacity for future development, the discussion of SCI should be revised to clarify the intent and capacity of Phase 1.	DWI S. Kubacki		
C-12c	Section 7 appears to discuss impacts and mitigation related to improvements to the sewer collection system, but the dam check valve is not mentioned at all. This project component needs to be included in Section 7 both in terms of construction impacts resulting from installation of the valve and operational impacts associated with use of the valve to change the water level in the lake.	DWI S. Kubacki	Impacts and mitigation related to the sewer access valve has been added to each subsection of Section 7.0. A discussion was also added to Section 6.0	LaBella H. Miller
C-13	Section 1.4 Summary of the Environmental Impacts and Mitigative Measures: In the paragraph that discusses secondary and cumulative impacts (SCI), briefly discuss whether the project will allow for growth in the project area or is intended to serve the existing population only. If the project is intended to support growth, the SCI discussion must address impacts associated with growth and development.	DWI S. Kubacki	Paragraphs have been added to Section 1.4 to discuss SCI and service area.	LaBella H. Miller

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C-14	Section 7.7 Water Resources: Other sections of the ER/EID indicate that the proposed improvements will reduce SSOs and improve treated wastewater quality, but the discussion of operational impacts to surface waters in the project area does not appear to include an analysis of these impacts. Downstream impacts associated with increasing and then decreasing the lake level should also be discussed in greater detail.	DWI S. Kubacki	Operational impacts have been added to this section.	LaBella H. Miller
C-15	Section 7.10 Shellfish, Fish, and Their Habitats: Potential impacts to aquatic species and habitats associated with increasing and then decreasing the lake level should be discussed in greater detail	DWI S. Kubacki	Discussion of impacts due to decreasing and increasing the lake level have been added to this section.	LaBella H. Miller
C-16	Section 7.11 Wildlife and Natural Vegetation: For the threatened and/or endangered (T&E) plant species, please provide additional information on what measures will be taken to ensure that these species will not be damaged by construction equipment. Surveys may be needed to identify specific locations to avoid impacts.	DWI S. Kubacki	Additional information has been included in this section to discuss measures taken to reduce damage by construction equipment.	LaBella H. Miller
C-17	Section 7.12 Public Lands and Scenic, Recreational & State Natural Areas: The section lists a number of identified resources and then jumps to a discussion of SCI without a discussion of potential direct impacts and mitigation. Revise the discussion to address direct impacts or explain why none are anticipated.	DWI S. Kubacki	Direct impacts and mitigation have been added to this section.	LaBella H. Miller
C-18	Section 7.17 Environmental Justice Analysis			
C-18a	Please provide the percentages (not percentiles) of low income and minority populations in the project area to clearly demonstrate whether there is a significant environmental justice population	DWI S. Kubacki	The figures do show percentages, not percentiles as generated by EJSreen: Environmental Justice Screening and Mapping Tool.	LaBella H. Miller
C-18b	The legends on Figures 7.11 and 7.12 are not legible. Please correct. (Disregard this comment if this is an issue only in the PDF version and not the printed document).	DWI S. Kubacki	There must be an issue in the .pdf version as the printed document shows the legends legibly.	LaBella H. Miller
C-19	Table 7.18 Mitigative Measures: Revise the table as needed to reflect any changes made in response to the preceding comments	DWI S. Kubacki	This table has been revised as needed.	LaBella H. Miller
C-20	Please review and address the attached comments from the DEQ review. Note that additional comments from cross-cutter review agencies (Fish & Wildlife Service) are anticipated shortly and will be forwarded as soon as they are available	DWI S. Kubacki	US Fish and Wildlife Service comments have been addressed.	LaBella H. Miller



Town of

Lake Lure

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North Carolina

April 4, 2021

Mr. Jon Risgaard
Section Chief
State Revolving Fund Section
Division of Water Infrastructure
512 North Salisbury Street, 8th Floor
Raleigh, NC 27604

RE: Request for 30-year loan
Town of Lake Lure
Wastewater Collection and Treatment System Improvements
NCDEQ-DWI Project No. CS370489-05

Dear Mr. Risgaard,

The Town of Lake Lure was awarded a \$12,580,261 loan at 0% with \$500,000 in principal forgiveness to fund the first phase of the subaqueous sanitary sewer collection system replacement and WWTP rehabilitation. This project would allow for Lake Lure to begin abandoning its aging non-compliant collection system as well as rehabilitating its non-compliant WWTP to set the stage for an eventual return to a biological process. This loan has been requested as a 30-year term from the first funding application in April of 2016. Despite the various approaches to solving the complex issues in Lake Lure, the financial need for a 30-year term has not changed. The utility rates for current Lake Lure customers have been raised substantially to fund the debt service based on a 30-year term. This is a critical component of maximizing the quantity of infrastructure that will be replaced or rehabilitated in Phase 1 of the project, while maintaining affordable debt service levels and the ability to begin preparing for subsequent phases. In light of these realities and at the request of DWI to update the 30-year loan request, this letter is to formally request a 30-year loan term for the referenced project. This is reflected in the financial analysis performed in the ER-EID for the referenced project that is currently in the review stage with NC DEQ – DWI. We trust that you will look favorably upon this request. Should you need additional information, please do not hesitate to contact us.

Sincerely,

Shannon Baldwin
Town Manager

CC: Ken Pohlig, NCDEQ-DWI
Maurice J. Walsh, LaBella Associates

