Town of Waynesville

Water & Sewer Asset Management Plan

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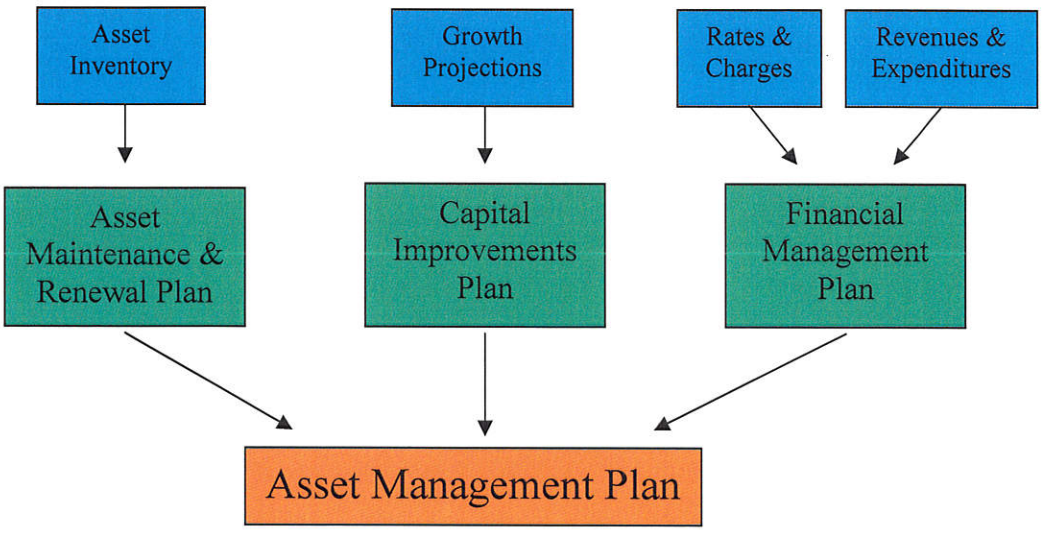
INTRODUCTION

The purpose of a water and sewer asset management plan is to present a strategy for operating and maintaining in a sustainable and cost effective manner so that the Town continues to provide the required level of service for current and future users. This water and sewer asset management plan for Waynesville achieves several purposes as listed below:

- It provides a description of components of the water and sewer systems.
- It estimates the value of the water and sewer systems.
- It provides financial forecasts of expenditures, including maintenance and capital costs.
- It creates a timeline for improvements that will ensure financial resources are used wisely.
- It satisfies the requirements of North Carolina House Bill 1744, which includes asset management planning in a list of common criteria that receive priority for loan and grant funding.

The Town's water and sewer asset management plan is based upon audited financial statements, historic records, personal knowledge of the Town of Waynesville's staff, and capital needs collected by McGill Associates. As depicted below, it puts a system in place that will provide documentation, maintain an asset inventory, and assess valuations. Because of constantly changing variables in those areas and limited information, this asset plan should be reviewed annually, updated, and revised so it keeps an accurate description of the water and sewer systems.



DESCRIPTION OF WATER AND SEWER SYSTEMS

The Town manages its water and sewer systems as two enterprise funds. The costs to operate the water and sewer treatment plants are separately recorded within each respective fund but some other costs including administration are distributed within both funds, as shown in the Town audits. The water fund operates with a budget of approximately $2.2 million and serves over 6,300 customers. The sewer fund operates with a budget of approximately $1.9 million and serves over 4,700 customers.

Asset Details

This plan categorizes the Town's water and sewer assets into three major groups. These include:

1. Water Lines
2. Sewer Gravity Lines & Force Mains
3. Other Assets

Water Treatment and Distribution Assets

The Water Treatment Plant sources raw water from a reservoir located on Allens Creek where Steestachee Branch, Ball Creek, Cherry Grove Branch, Shiney Creek, Deep Gap Creek, and Bear Pen Branch converge. Water from this reservoir flows to the Water Filter Plant for treatment. The water supply system comprises approximately 751,583 feet of supply main and distribution lines. The distribution of pipe sizes and materials are presented in Figures 1 and 2, with ages of pipes detailed in Figure 3. The data used to create the figures is attached in the Appendix.

FIGURE 1

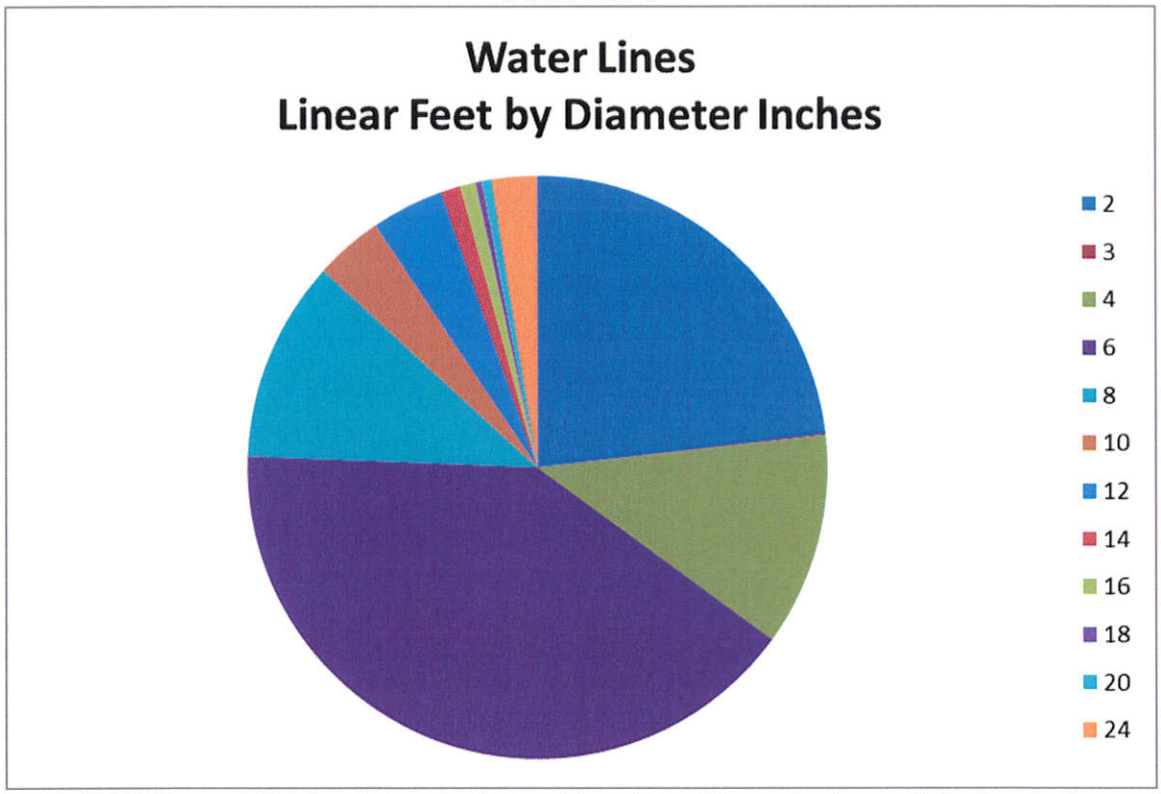


FIGURE 2

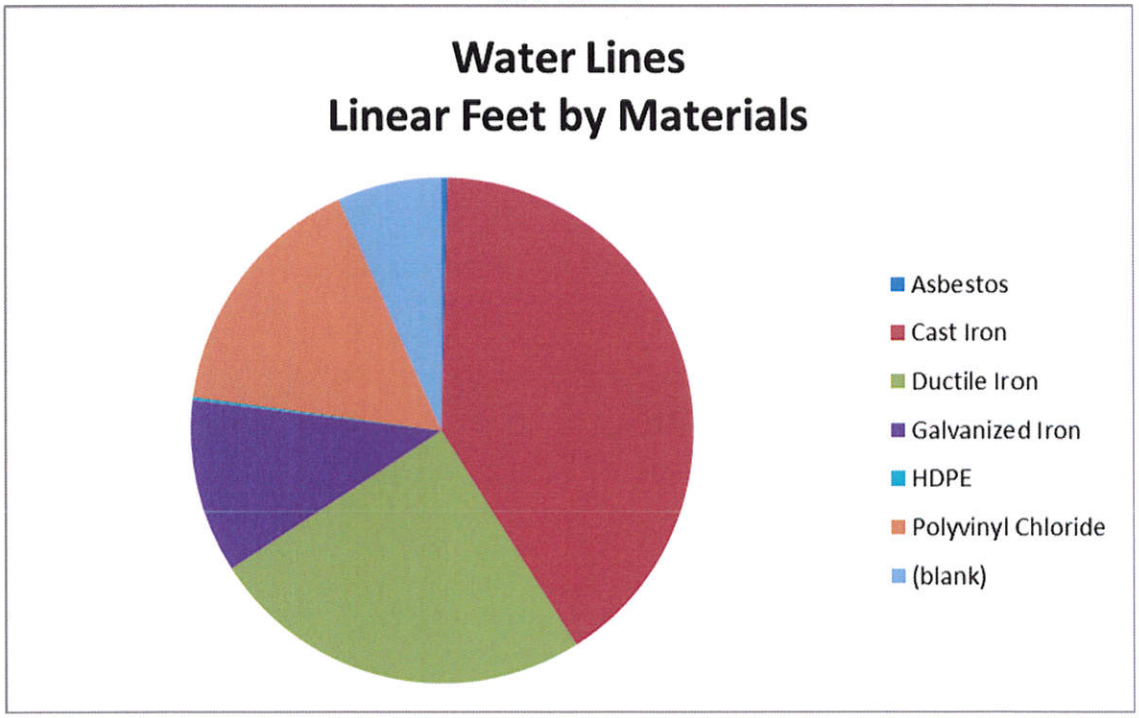
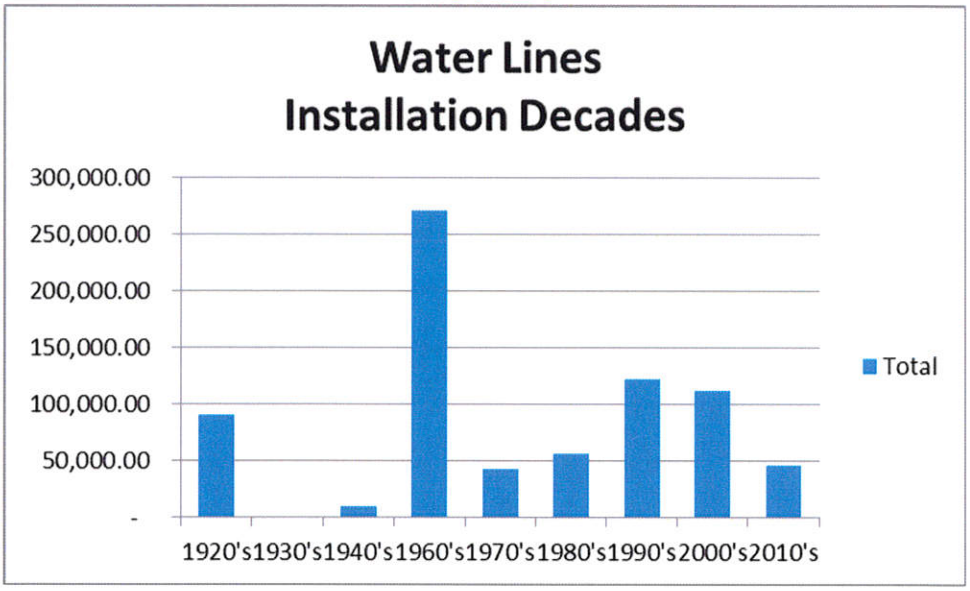


FIGURE 3



Sewer Treatment and Collection Assets

The Town maintains one sewer treatment plant, located along Richland Creek, where it meets Jones Cove Branch. There are no sewer pump stations; all sewage flows by gravity to the plant through a network of various types of pipes. Upon treatment, water is discharged to the Pigeon River below Richland Creek. This sewer collection system comprises approximately 546,878 feet of mains and lines. The distribution of gravity and force main pipe sizes and materials are presented in Figures 4 and 5, with installation decades shown in Figure 6. The data used for the figures is attached in the Appendix.

FIGURE 4

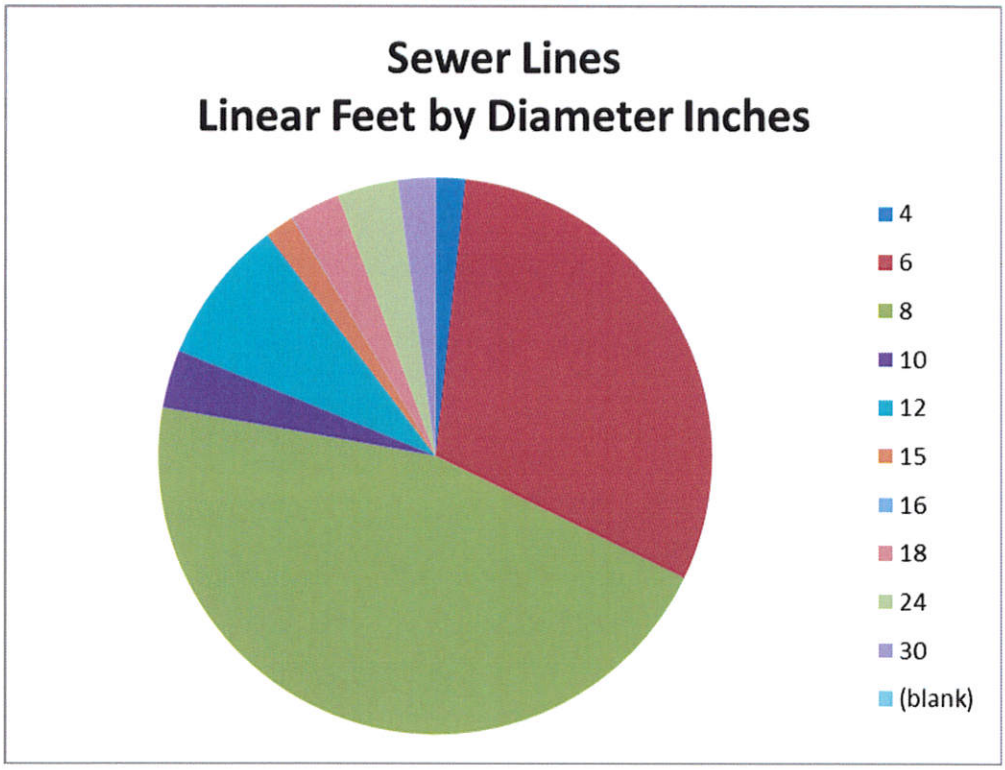


FIGURE 5

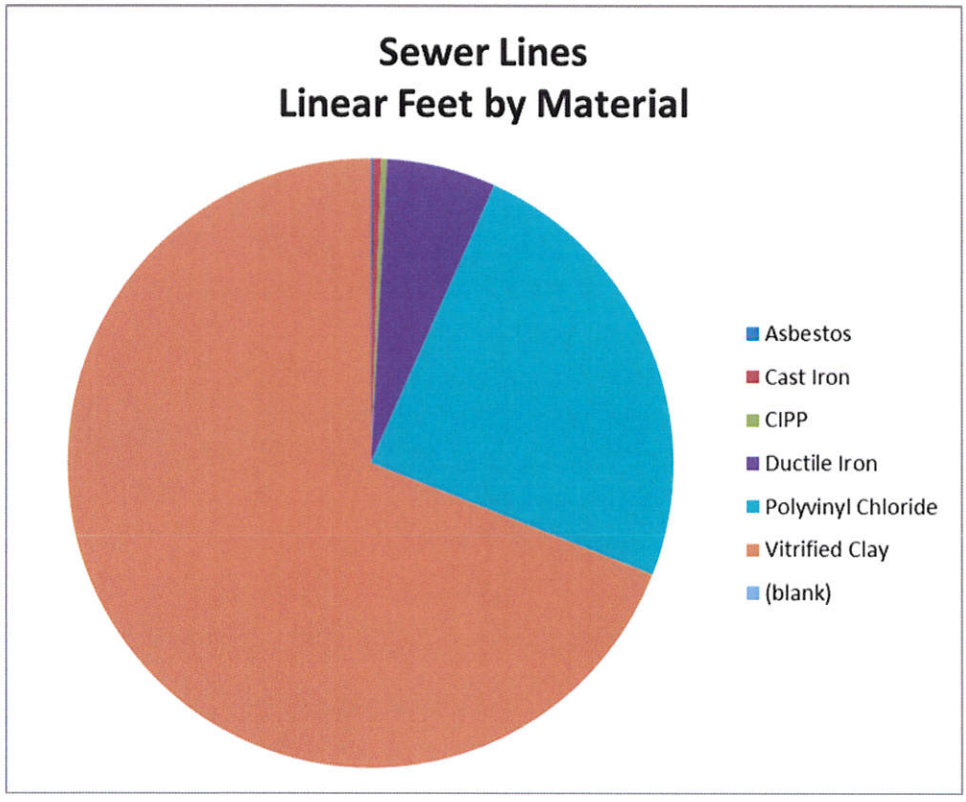
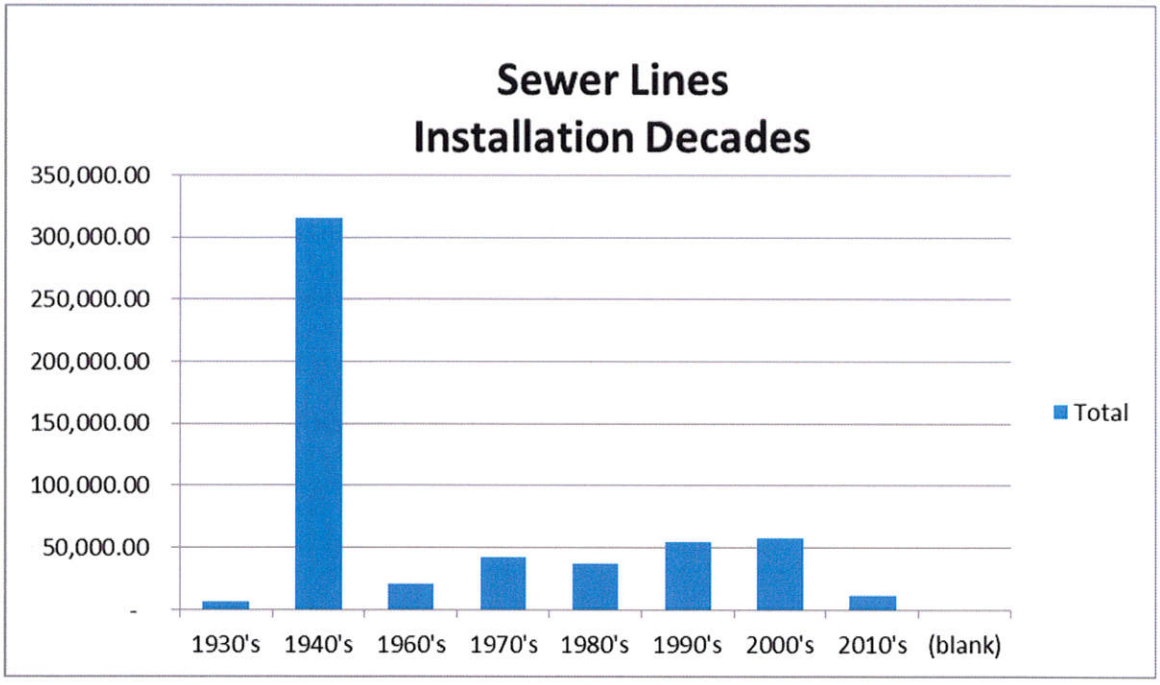


FIGURE 6


Sewer Lines
Installation Decades
350,000.00
300,000.00
250,000.00
200,000.00
150,000.00
100,000.00
50,000.00
-
1930's
1940's
1960's
1970's
1980's
1990's
2000's
2010's
(blank)
Total

ASSET CATEGORIZATION

For effective analysis, assets are grouped into classes according to their type. Such categorization allows inferences to be drawn across asset classes and investment plans to be prioritized. For each asset group, subgroups can be created according to the common traits of the asset (i.e. diameter, material, etc). The number of subgroups formed depends upon the amount of information available and the degree of detail required in the asset management process.

In addition, since different asset classes have different useful lives, it is essential to define asset life categories to allow appropriate transparency to be achieved, especially related to the Town's asset depreciation policy. Appropriate categorizations are: Very Short, Short, Medium, Long and Very Long, defined as follows:

- **Very Short** asset lives are up to 5 years. Computers, hot water washers, and flow meters are examples of assets that have very short lives.

- **Short** asset lives range from 6 to 15 years. Scales, backhoes, vehicles, and rollers have short lives.

- **Medium** asset lives are from 16 to 30 years long. Assets with medium lives generally are mechanical assets such as pumps, process plants, filter bed media, screens, and scrubbers.

- **Long** asset lives are between 31 and 50 years long. Assets that have long lives are generally mechanical assets such as filter bed structures, steel storage tanks, some buildings, and some treatment works.

- **Very Long** asset lives are typically in excess of 50 years. Long-lived assets are generally operational structures such as spillways, lines, and some treatment works.

The key implementation issue is the availability of data to create and populate the groups and sub-groups created. Within the Town of Waynesville's water and sewer system, some of the key data is not known. An important part of the implementation strategy is, therefore, to make assumptions to infer missing data, or alternatively, by extrapolating from known data.

ASSET VALUATION AND USEFUL LIFE

Asset Life Cycle

Assets have a life cycle through which they progress from the initial concept to the final disposal. Depending on the type of asset, its lifecycle may vary from 5 years to over 50 years. Key stages in the asset life cycle are:

- **Asset planning**
  The period when the new asset is designed. Decisions made at this time influence the cost of operating the asset and the lifespan of the asset. Alternative, non-asset solutions, must also be considered.

- **Asset creation or acquisition**
  When the asset is purchased, constructed or vested. Capital cost, design and construction standards, commissioning the asset, and guarantees by suppliers influence the cost of operating the asset and the lifespan of the asset.

- **Asset operations and maintenance**
  When the asset is operated and maintained. Operation relates to a number of elements, including efficiency, power costs and throughput. This is usually more applicable to mechanical plant rather than static assets, such as pipes. Maintenance relates to preventative maintenance where minor work is carried out to prevent work that is more expensive in the future and reactive maintenance where a failure is fixed.

- **Asset condition and performance monitoring**
  When the asset is examined and checked to ascertain the remaining life of the asset, what corrective action is required including maintenance, rehabilitation or renewal and within what time.

- **Asset rehabilitation and renewal**
  When the asset is restored or replaced to ensure that the required level of service can be delivered.

- **Asset disposal and rationalization**
  Where a failed or redundant asset is sold off, put to another use, or abandoned.

Asset Failure Modes

Generally, it is assumed that physical failure is the critical failure mode for many assets. However, asset management recognizes that other manners are relevant and are often critical for effective delivery of services. The range of failures include:

- **Structural**
  The physical condition of the asset is the measure of deterioration, service potential and remaining life.

- **Capacity**
  The level of under or over capacity of the asset is measured against the required level of service to establish the remaining life.

- **Level of service**
  Reliability of the asset or performance targets are not achieved.

- **Cost or economic impact**
  The cost to maintain or operate an asset is greater than the economic return.

- **Obsolescence**
  Technical change or lack of replacement parts can render an asset uneconomic to operate or maintain.

It is important to know the expected length of an asset's lifecycle and how it will likely fail in order to properly determine future needs.

Asset Valuation Method

A valuation of the water and sewer assets was undertaken in FY 2013. Considering the data that was available, the valuation bases used were Depreciated Replacement Cost for water and sewer lines and Depreciated Original Cost for the other assets. Replacement cost is the cost of building the existing infrastructure using present day technology, but maintaining the originally designed level of service. Depreciated Replacement Cost recognizes the wear and tear and deterioration of assets by calculating the depreciable component of Replacement Cost proportioned by the ratio of remaining useful life to economic life on a straight-line basis.

Water and sewer line length and diameter figures from the last asset management plan and Town records were used to estimate the costs of replacing the lines today. Total linear feet of lines were subtotaled into their respective diameters and then multiplied by an average replacement cost per foot for each size. The estimated replacement value of the water and sewer lines total $24.6 million and $31.9 million, respectively. After determining the replacement value, the age of each of the lines was used to estimate how much depreciation has occurred and how much residual value remains. Details of the ages of the water and sewer lines by diameter are shown in Figures 7 and 8.

FIGURE 7
WATER LINES
LINEAL FEET BY INSTALL DECADE AND DIAMETER

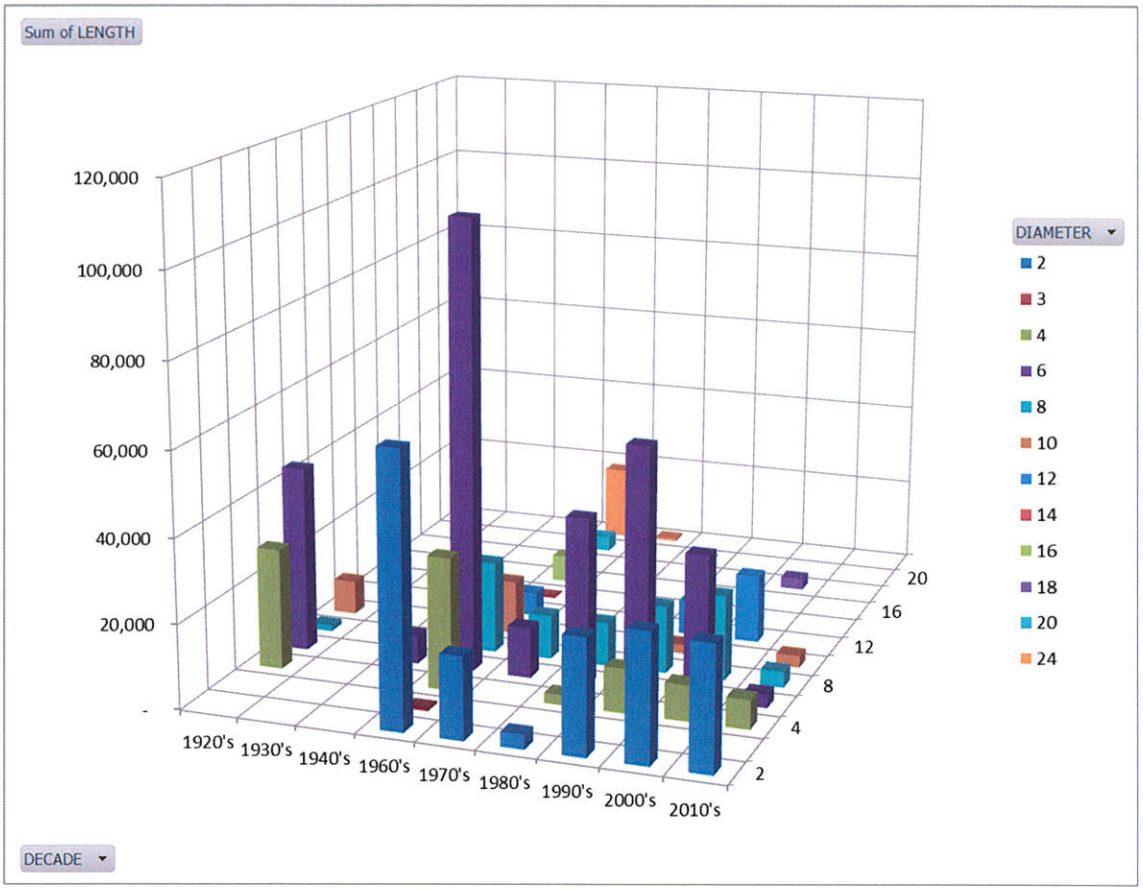
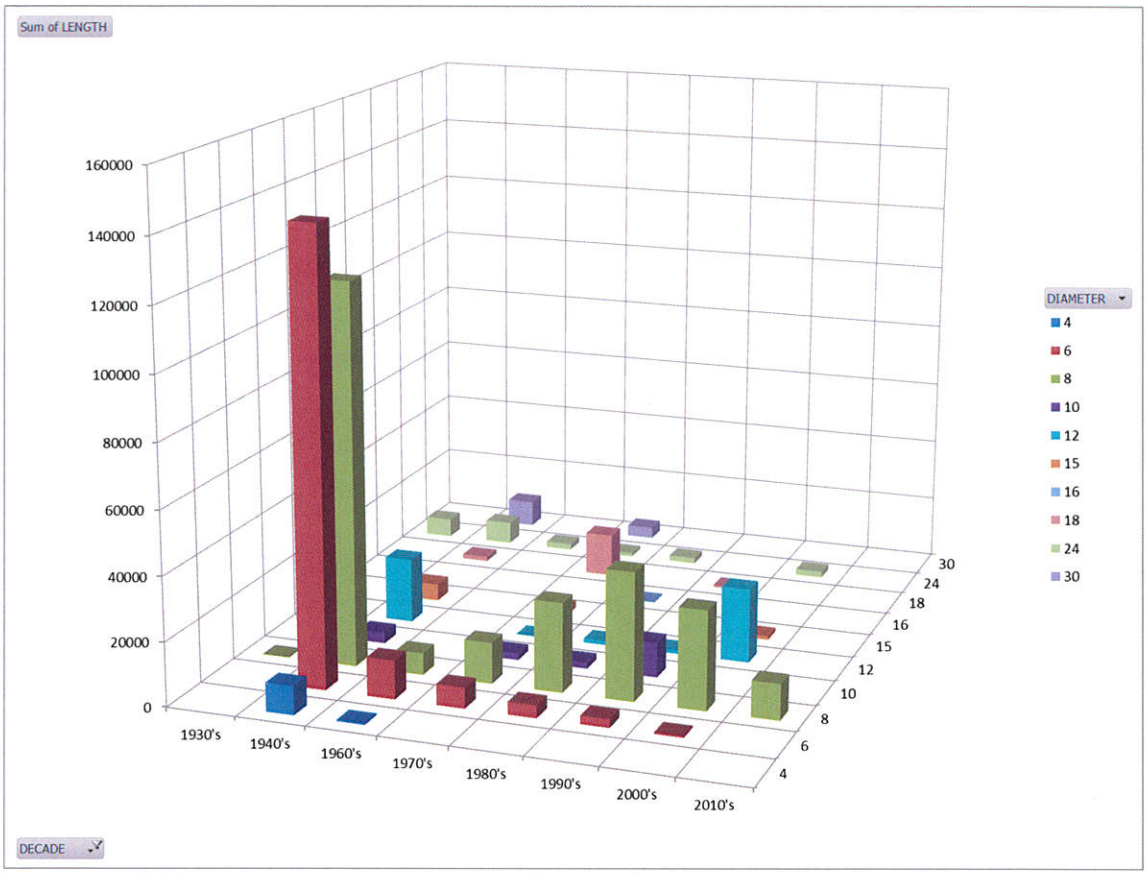


FIGURE 8
SEWER LINES
LINEAL FEET BY INSTALL DECADE AND DIAMETER



Straight-line depreciation and average lives of 75 and 50 years for water and sewer respectively were used in the calculations. In addition, it was assumed that a line that is older than its useful life or one with an unknown age retains 10% of its replacement value. As a result, the depreciated values of the water and sewer lines are estimated to be $12.6 million and $8.9 million, respectively.

The value of the water and sewer assets other than lines were depreciated on a straight-line basis over their nominal working life. Figures 9 and 10 show the depreciated values of the other water and sewer assets by Useful Life category.

FIGURE 9

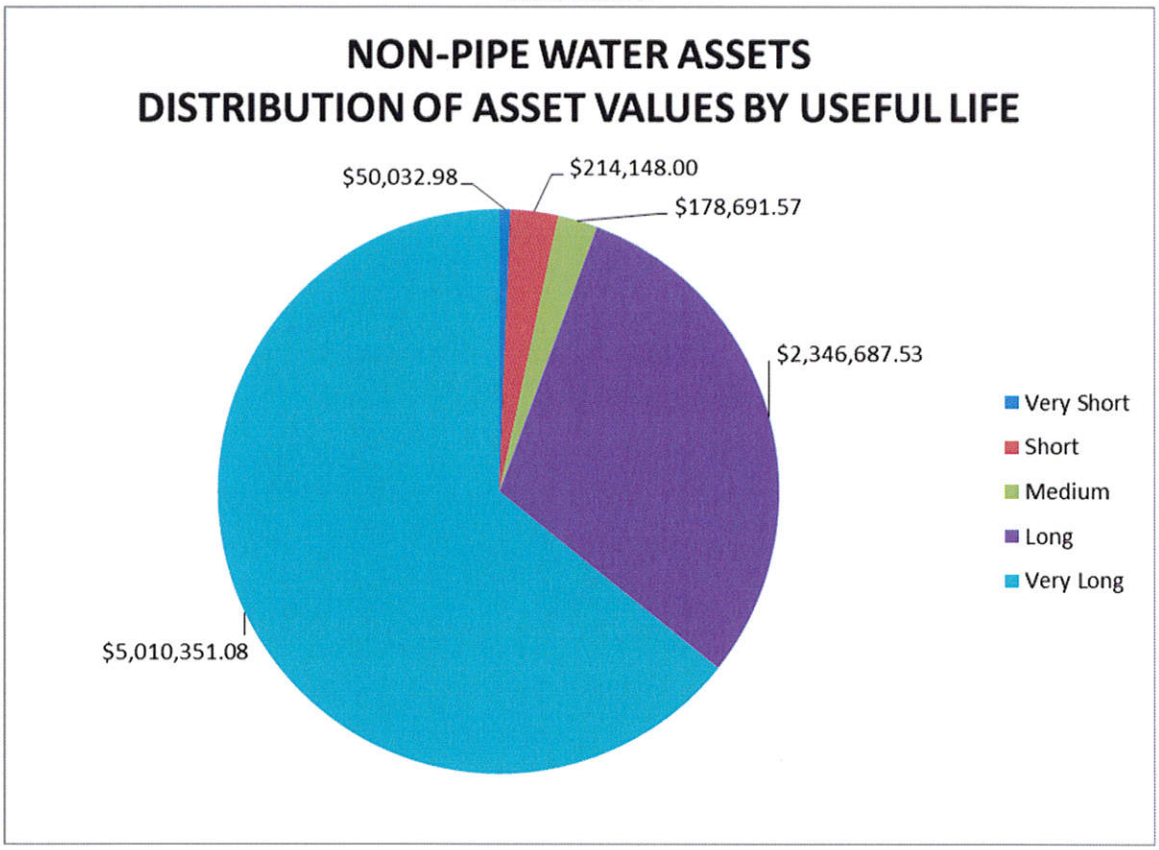
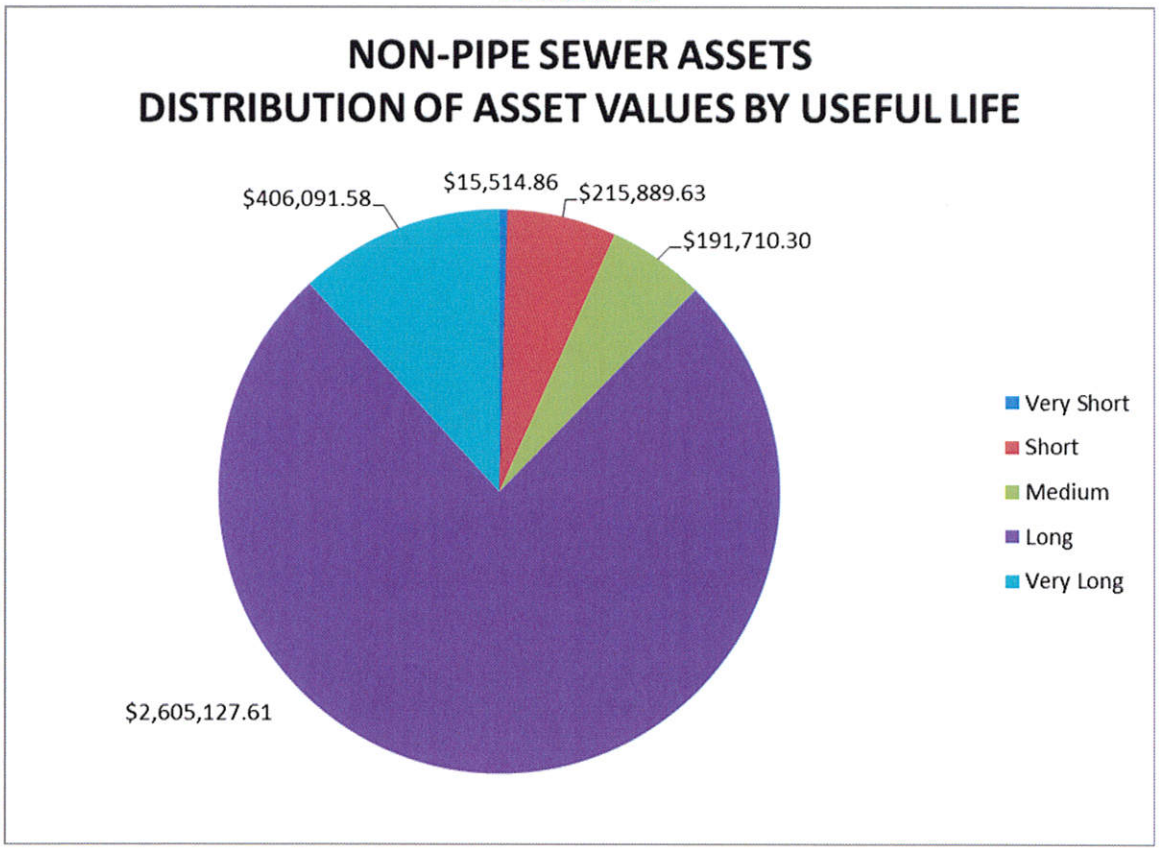


FIGURE 10



When combined, the depreciated values of these other water and sewer assets total $11.2 million. It should be noted that the value of these non-line assets using this methodology is significantly lower than what is necessary to replace them today. Inflation of costs since the installation dates is not considered in depreciation reports. This discrepancy would be seen in the value of the water and sewer lines if they were analyzed using the same methodology. Additional data that is currently unavailable is necessary in order to value the non-line assets using other methodologies. Below is a summary of the values of the water and sewer systems:

TABLE 11

TOWN OF WAYNESVILLE

SUMMARY OF ESTIMATED WATER AND SEWER ASSET VALUES

WATER LINES	$12,600,000
OTHER WATER ASSETS	$7,800,000
WATER SUBTOTAL	**$20,400,000**
SEWER LINES	$8,900,000
OTHER SEWER ASSETS	$3,400,000
SEWER SUBTOTAL	**$12,300,000**
WATER AND SEWER TOTAL	**$32,700,000**

REPLACEMENT & REFURBISHMENT PROGRAM

Current Asset Maintenance

Maintenance is the regular ongoing day-to-day work necessary to keep assets operating including instances where portions of the asset fail and need immediate repair to make the asset operational again. This includes:

- Routine Maintenance – Ongoing work aimed at maintaining individual component asset function and serviceability rather than expanding service.

- Renewals – Component replacements at or near the end of its life.

The projected costs to maintain or replace current water and sewer lines are expected to be great in the future because 49% of water lines and 63% of sewer lines were installed during or before the 1960s. These lines are over 40 years old, are near the end of their useful lives, and have a significant risk of failure. These two sets of lines were grouped together and sorted by diameter so varying costs can be assigned to each respective size. By multiplying the average cost per linear foot by the respective lengths, the estimated costs to replace the water and sewer lines over 40 years old are approximately $13.6 million and $19.7 million, respectively, as shown in Tables 12 and 13.

TABLE 12
PRE-1970 WATER LINES
REPLACEMENT COSTS

Sum of LENGTH	DECADE					Replacement	Replacement
DIAMETER	1920's	1930's	1940's	1960's	Grand Total	Cost per Foot	Cost
2				64,470	64,470	$ 13.50	$ 870,342.49
3				506	506	$ 18.00	$ 9,115.45
4	28,789			31,493	60,282	$ 22.50	$ 1,356,340.61
6	44,334		6,823	106,647	157,805	$ 31.50	$ 4,970,856.59
8	1,359			21,768	23,127	$ 39.50	$ 913,531.15
10	8,169		2,334	12,763	23,267	$ 45.00	$ 1,046,998.85
12			447	5,634	6,081	$ 50.00	$ 304,038.80
14	8,181			170	8,350	$ 61.50	$ 513,550.52
16				6,387	6,387	$ 73.00	$ 466,276.26
20				3,500	3,500	$ 125.83	$ 440,421.20
24				18,123	18,123	$ 151.00	$ 2,736,646.39
Grand Total	90,833		9,604	271,462	371,899		$ 13,628,118.30

TABLE 13
PRE-1970s SEWER LINES
REPLACEMENT COSTS

Sum of LENGTH	DECADE				Replacement	Replacement
DIAMETER	1930's	1940's	1960's	Grand Total	Cost per Foot	Cost
4		9006.426	397.024	9403.45	$ 34.00	$ 319,717.30
6		140943.616	12064.268	153007.884	$ 42.50	$ 6,502,835.07
8	82.483	119441.451	6849.044	126372.978	$ 50.00	$ 6,318,648.90
10		3436.166		3436.166	$ 56.00	$ 192,425.30
12		20416.888		20416.888	$ 62.00	$ 1,265,847.06
15		5364.854		5364.854	$ 61.00	$ 327,256.09
18		1444.441		1444.441	$ 73.00	$ 105,444.19
24	5957.876	7053.478	1833.494	14844.848	$ 185.00	$ 2,746,296.88
30		8381.388		8381.388	$ 231.25	$ 1,938,195.98
Grand Total	6040.359	315488.708	21143.83	342672.897		$ 19,716,666.76

Funding all of the abovementioned replacement costs would require water and sewer revenue increases that would be very burdensome for most users. In an effort to address these refurbishment needs while also minimizing rate increases, the following sets of expenses are proposed to be financed:

1. WATER LINES
    a. Water Line replacements totaling $3 million between FY 2014 and FY 2023.

2. SEWER LINES
    a. Sewer Line replacements totaling $4.81 million between FY 2014 and FY 2023.

Risk Assessment

It is probable that the Town of Waynesville will realize several failures of their water and sewer assets during the next 20 years. More than half of all water and sewer lines were installed during or before the 1960s and are at least 40 years old. Since the expected useful life has ended and the assets are fully depreciated, the water and sewer systems are exposed to the risk of service outages. A liability exists that is greater than what is shown in the CIP; the CIP focuses only on the infrastructure at most risk. Therefore, it is imperative that conditional assessments be conducted for all aging lines to help better estimate when each failure will occur. This will help balance the need to minimize replacement costs while also minimizing unexpected system failures.

Adding New Assets

As new assets are purchased by the Town of Waynesville, the costs to refurbish and maintain the overall system will increase. It is prudent to know how long an asset can operate before funds must be spent to maintain its level of service. Equally as important is recognizing how long an asset will likely operate before it will need to be replaced. Figures 14-16 illustrate the estimated time after an asset purchase before required financial obligations are anticipated to arise and the asset's estimated useful life:

FIGURE 14
NEW LINE ASSETS
TIMETABLE OF MAINTENANCE AND USEFUL LIFE

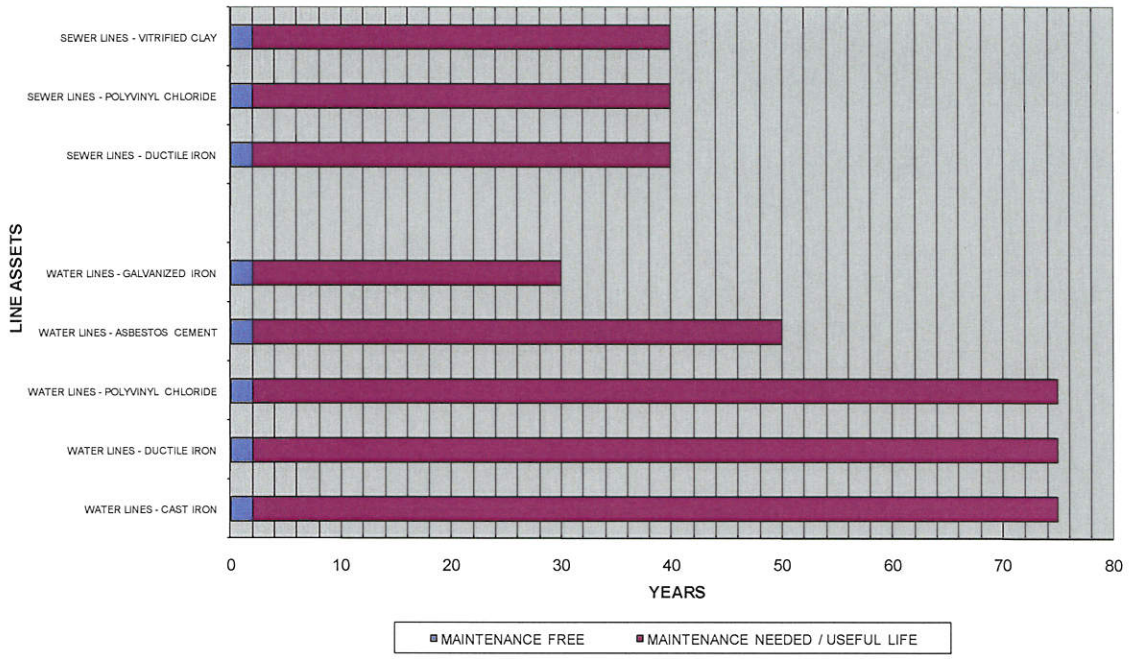


FIGURE 15
NEW BUILDING ASSETS
TIMETABLE OF MAINTENANCE AND USEFUL LIFE

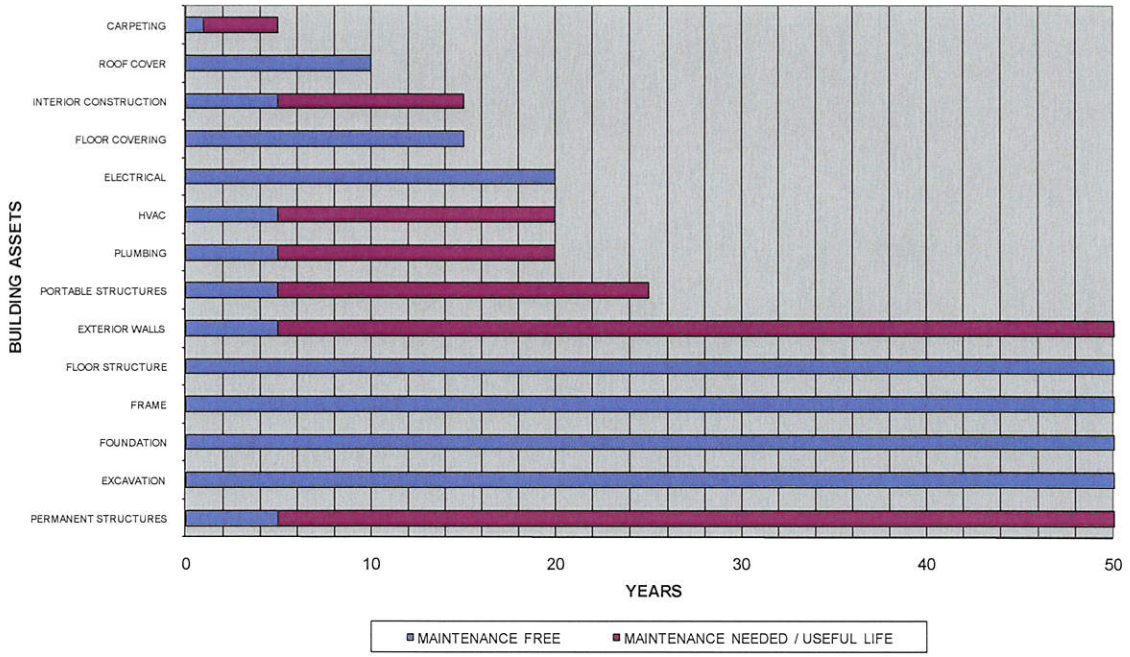
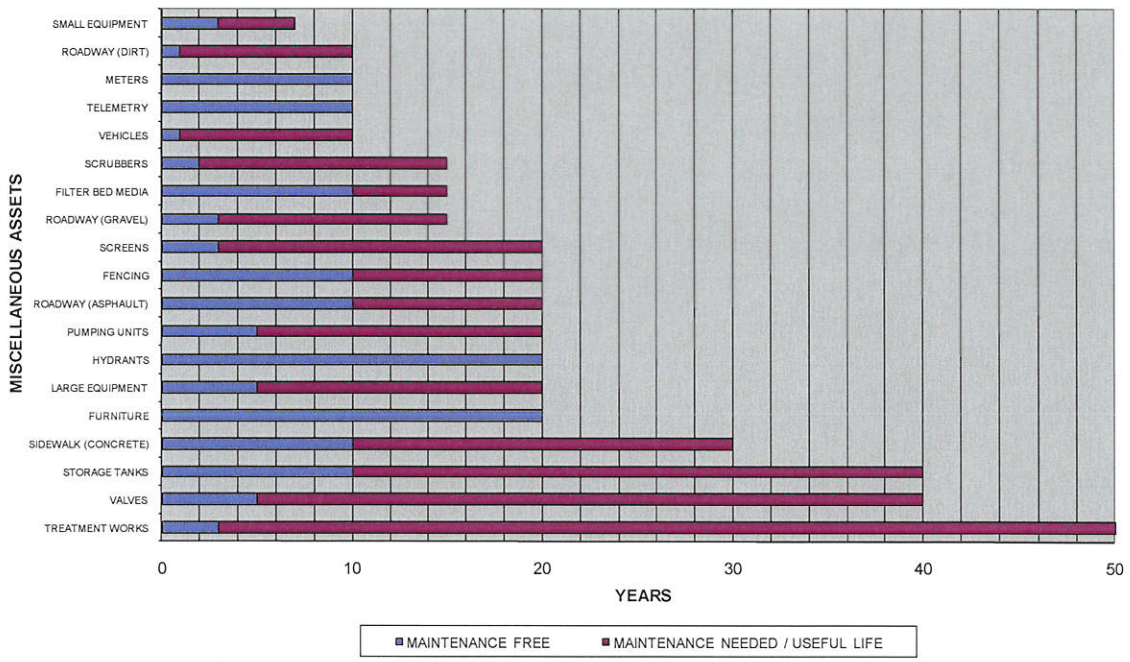


FIGURE 16
NEW MISCELLANEOUS ASSETS
TIMETABLE OF MAINTENANCE AND USEFUL LIFE



Source: McGill Associates

Conclusions

The maintenance needs for the Town of Waynesville are always changing. Over time, some assets will be removed because they have reached the end of their useful lives. As a result, the existing asset inventory will slowly diminish. However, as assets are eliminated, new assets will be added to the system, either to replace old assets or to provide new services. It is imperative that the Town Public Utilities department continue to work closely with the GIS department to ensure that the knowledge of asset characteristics and conditions are recorded and closely monitored. Knowing the key what, when, and where features of assets will help Town staff understand which assets are at greatest risk of failure, what service levels are expected from these assets, and maintain enough information to choose optimal use of limited funds. McGill Associates reviewed the condition of water and sewer assets with Town staff and considered future system needs that warrant the creation of new capital projects. In the following section, the Town of Waynesville's water and sewer asset needs over the next 10 years are briefly examined.

Capital Improvements Plan

The Capital Improvements Plan (CIP) reflects proposed or planned water and sewer capital improvements for the next 10 years within the current Town limits and the Lake Junaluska Assembly. These needs are based upon the knowledge of Town staff and McGill Associates. As is illustrated in Table 17, there are 34 improvement projects proposed for water and 35 improvement projects proposed for sewer. Each column represents the annual project costs for each of the next 10 years. The costs of the projects total over $21 million.

Due to the financial demands that these projects would place upon the funds, the analysis assumes that each improvement is planned to be paid either by a capital outlay in a specific fiscal year or by debt resulting in an annual debt service payment. The annual spending during the next 10 years is projected to exceed $2 million, which may place excessive pressure upon the Town's budget. The most significant projects during the next 10 years include:

WATER

- $3,000,000 for line replacements.
- $2,084,000 for Lake Junaluska Assembly Phase 2 improvements.
- $1,104,000 for Lake Junaluska Assembly Phase 1 improvements.

SEWER

- $4,810,000 for line replacements.
- $1,925,000 for nutrient removal at the wastewater treatment plant.
- $615,000 for Lake Junaluska improvements on Liberty and Kilgore.

TABLE 17
TOWN OF WAYNESVILLE
WATER AND SEWER CAPITAL IMPROVEMENTS PLAN

PROJECT LOCATION	COST	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
WATER IMPROVEMENTS											
ADMINISTRATION											
SCADA	75,000	45,000		30,000							
VEHICLES											
TRUCKS - MAINTENANCE	466,000	42,000	43,000	44,000	45,000	46,000	47,000	48,000	49,000	50,000	52,000
TRUCKS - TREATMENT	52,000	25,000							27,000		
EQUIPMENT											
TRACKHOE	150,000			70,000							80,000
BOBCAT EXCAVATOR	60,000										60,000
BOBCAT SKID STEER											
TRENCH ROLLER	45,000		45,000								
TOOLS - MAINTENANCE	140,300	12,200	12,600	13,000	13,400	13,800	14,200	14,600	15,000	15,500	16,000
TOOLS - TREATMENT	140,300	12,200	12,600	13,000	13,400	13,800	14,200	14,600	15,000	15,500	16,000
LINE EXTENSIONS											
HOWELL MILL 10-IN	435,000			145,000	145,000	145,000					
HOWELL MILL RD CONNECTOR 10-IN	250,000			250,000							
LINE REPLACEMENTS											
MISCELLANEOUS	3,439,000	300,000	309,000	318,000	328,000	338,000	348,000	358,000	369,000	380,000	391,000
TREATMENT PLANT IMPROVEMENTS											
WATERSHED	73,000	6,400	6,600	6,800	7,000	7,200	7,400	7,600	7,800	8,000	8,200
CONCRETE REPAIR - SPILLWAY	500,000				500,000						
DAM	20,000										20,000
STORAGE TANKS	60,000									30,000	30,000
PUMPS	53,600	4,700	4,800	4,900	5,000	5,200	5,400	5,600	5,800	6,000	6,200
FILTERS - REBUILD	173,000					173,000					
SEDIMENTATION TANKS	10,000								10,000		
DREDGE	50,000										50,000
SOLAR SAMPLER	60,000										60,000
BIG COVE TANK PAINTING	100,000		100,000								
FLOCCULATORS REPLACEMENT	100,000	5,000	95,000								

TABLE 17
TOWN OF WAYNESVILLE
WATER AND SEWER CAPITAL IMPROVEMENTS PLAN

PROJECT LOCATION	COST	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
PUMP STATIONS											
EAGLES NEST PHASE 1	16,000							16,000			
LAUREL RIDGE DRIVE PHASE 2 NORTH	12,000									12,000	
EAGLES NEST PHASE 4 NORTH	12,000								12,000		
LITTLE MTN PHASE 2 SOUTH	6,000				6,000						
RIDGEWOOD PHASE 2	12,000										12,000
CHESTNUT WALK	10,000						10,000				
STORAGE											
CHESTNUT WALK	151,000					151,000					
LAKE JUNALUSKA ASSEMBLY											
VEHICLES & EQUIPMENT	50,000	23,000						27,000			
WATER METERS	172,000			18,000	19,000	20,000	21,000	22,000	23,000	24,000	25,000
PHASE 1 IMPROVEMENTS	1,104,000		544,000	560,000							
PHASE 2 IMPROVEMENTS	2,084,000			234,000	241,000	249,000	256,000	264,000	272,000	280,000	288,000
WATER IMPROVEMENTS SUBTOTAL	10,006,200	430,500	1,172,600	1,676,700	1,322,800	1,162,000	723,200	777,400	805,600	821,000	1,114,400

DEBT 1 DEBT 2

DEBT PACKAGES			2,751,000				1,360,000				
ANNUAL DEBT	$0	$544,000	$1,044,000	$741,000	$422,000	$256,000	$264,000	$272,000	$280,000	$288,000
ANNUAL CAPITAL OUTLAY	$430,500	$628,600	$632,700	$581,800	$740,000	$467,200	$513,400	$533,600	$541,000	$826,400

TABLE 17
TOWN OF WAYNESVILLE
WATER AND SEWER CAPITAL IMPROVEMENTS PLAN

PROJECT LOCATION	COST	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
WASTEWATER IMPROVEMENTS											
VEHICLES											
TRUCK - TREATMENT	25,000			25,000							
DUMP TRUCK											
EQUIPMENT											
TOOLS - MAINTENANCE	452,100	39,400	40,600	41,800	43,100	44,400	45,700	47,100	48,500	50,000	51,500
TOOLS - TREATMENT	282,100	24,600	25,300	26,100	26,900	27,700	28,500	29,400	30,300	31,200	32,100
MOWERS	21,000	9,000						12,000			
LOADER											
SKID STEER											
BACKHOE											
LINE REPLACEMENTS											
MISCELLANEOUS	4,810,000	400,000	450,000	460,000	470,000	480,000	490,000	500,000	510,000	520,000	530,000
NC DOT 209 RELOCATION	65,000			65,000							
NC DOT REST AREA IMPROVEMENT	770,000	40,000	730,000								
TREATMENT PLANT IMPROVEMENTS											
SLUDGE STABILIZATION	150,000		35,000		75,000		40,000				
ROOF REPAIR	30,000	8,000				10,000				12,000	
BELT PRESS	400,000									400,000	
WASTE / SLUDGE PUMPS	11,500	11,500									
2 RAS AND 2 WAS PUMP STATION	20,000	10,000		10,000							
VARIABLE FREQUENCY DRIVES	101,000		80,000					21,000			
PRIMARY SLUDGE PUMP STATION	20,000		20,000								
BLOWERS	144,500	4,500		30,000	30,000			40,000	40,000		

TABLE 17
TOWN OF WAYNESVILLE
WATER AND SEWER CAPITAL IMPROVEMENTS PLAN

PROJECT LOCATION	COST	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
DIGESTER	39,000	4,000		25,000	5,000					5,000	
WELL HOUSE	28,000				20,000						8,000
PRIMARY CLARIFIER	50,000				25,000		25,000				
THICKENER	8,000				8,000						
SECONDARY CLARIFIER	20,000		20,000								
CHLORINATOR	8,000								8,000		
DECHLORINATION	6,500		6,500								
LAB EQUIPMENT	73,000	6,400	6,600	6,800	7,000	7,200	7,400	7,600	7,800	8,000	8,200
HEADWORKS	105,000				5,000	70,000				30,000	
BRIDGE	500,000							500,000			
SLUDGE POLYMER BLENDER	85,000			85,000							
SLUDGE HEATER	350,000					350,000					
NUTRIENT REMOVAL	1,925,000				175,000	1,750,000					
STORAGE SHED	40,000	40,000									
PUMP STATIONS											
20-IN SEC RETURN PUMP	100,000			50,000	50,000						
MISCELLANEOUS	136,100	11,800	12,200	12,600	13,000	13,400	13,800	14,200	14,600	15,000	15,500
LAKE JUNALUSKA ASSEMBLY											
PHASE 1 IMPROVEMENTS (LIBERTY & KILGORE)	615,000		615,000								
PHASE 1 IMPROVEMENTS (IVEY & STUART)	455,000			455,000							
PHASE 1 IMPROVEMENTS (LITTLETON & GLENDALE)	265,000				265,000						
PHASE 2 IMPROVEMENTS (WELDON WAY)	232,000						232,000				
PHASE 2 IMPROVEMENTS (OXFORD & COKESBERRY)	251,000								251,000		
PHASE 2 IMPROVEMENTS (ATKINS LOOP)	455,000										455,000
WASTEWATER IMPROVEMENTS SUBTOTAL	13,048,800	609,200	2,041,200	1,292,300	1,218,000	2,752,700	882,400	1,171,300	910,200	1,071,200	1,100,300
				DEBT 1		DEBT 2		DEBT 3			
DEBT PACKAGES				1,335,000		2,275,000		1,838,000			
ANNUAL DEBT		$0	$615,000	$455,000	$440,000	$2,100,000	$232,000	$500,000	$251,000	$400,000	$455,000
ANNUAL CAPITAL OUTLAY		$609,200	$1,426,200	$837,300	$778,000	$652,700	$650,400	$671,300	$659,200	$671,200	$645,300

FINANCIAL MANAGEMENT STRATEGY

Revenue Requirement

The yearly required revenues for the Town of Waynesville's water and sewer funds are comprised of all the expenditures necessary to ensure consistent, quality service to all users. These expenditures ensure proper operation and maintenance of equipment, development and perpetuation of the system, and maintenance of the utilities' financial integrity. These cost components are divided into the following categories:

- Administration
- Operation and Maintenance costs
- Debt service
- Capital outlay

The total of all the above items is the required revenue for the Town's water and sewer funds as shown in the following table for FY 2012:

TABLE 18
TOWN OF WAYNESVILLE
FY 2012 COST ALOCATION OF WATER AND SEWER

REVENUES			EXPENDITURES		
			WATER ADMINISTRATION	218,612	
			WATER MAINTENANCE	752,920	
			WATER OPERATIONS	667,181	
WATER CHARGES	2,389,711		CAPITAL OUTLAY	184,709	
WATER TAPS	36,050		DEBT	359,329	
MISCELLANEOUS	6,873		TRANSFERS TO GENERAL FUND	103,100	
WATER SUBTOTAL	**2,432,634**	**55.93%**	**WATER SUBTOTAL**	**2,285,851**	**59.24%**
			SEWER ADMINISTRATION	179,293	
			SEWER MAINTENANCE	255,847	
			SEWER OPERATIONS	864,316	
SEWER CHARGES	1,874,888		CAPITAL OUTLAY	153,793	
SEWER TAPS	36,124		EXISTING DEBT	41,891	
MISCELLANEOUS	6,095		TRANSFERS TO GENERAL FUND	77,930	
SEWER SUBTOTAL	**1,917,107**	**44.07%**	**SEWER SUBTOTAL**	**1,573,070**	**40.76%**
TOTAL REVENUES	**4,349,741**	**100.00%**	**TOTAL EXPENDITURES**	**3,858,921**	**100.00%**

Debt Service Requirements

The water and sewer funds had a total of six outstanding debt obligations in FY 2012. They are comprised of two State Revolving Loans and four Installment Purchase Agreements, each with unique maturities. One of the revolving loans has been awarded to the Town but the note has yet to be signed. The analysis assumes that the Town will sign the loan. Over the next ten years, one loan will mature each year from FY 2014-2016 followed by another maturity in FY 2021. Each of the aforementioned debt obligations and their total annual payments over the next ten fiscal years are shown in Table 19.

TABLE 19
TOWN OF WAYNESVILLE
WATER AND SEWER FUNDS PRESENT DEBT SERVICE

	2013	YEAR 1 2014	YEAR 2 2015	YEAR 3 2016	YEAR 4 2017	YEAR 5 2018	YEAR 6 2019	YEAR 7 2020	YEAR 8 2021	YEAR 9 2022	YEAR 10 2023
WATER INSTALLMENT	51,270	51,270	51,270	25,635							
WATER LINE AND METER EQUIPMENT SRF	98,037	64,318	63,314	62,309	61,305	60,318	59,296	58,292	57,288	56,283	55,279
EAGLES NEST WATER SYSTEM	26,056	26,056	26,056	26,056	26,056	26,056	26,056	26,056	26,056		
BACKHOE / SEWER JET TRUCK	52,045	52,045	52,045								
WATER TREATMENT - RESERVOIR DRIVE TANK	118,680	92,187									
RADIO READ METERS - SRF (ESTIMATE)			23,421	23,074	22,728	22,382	22,035	21,689	21,342	20,996	20,650
EXISTING DEBT SERVICE	**346,088**	**285,876**	**216,106**	**137,074**	**110,089**	**108,756**	**107,387**	**106,037**	**104,687**	**77,279**	**75,929**
WATER DEBT	**302,988**	**242,776**	**173,006**	**137,074**	**110,089**	**108,756**	**107,387**	**106,037**	**104,687**	**77,279**	**75,929**
SEWER DEBT	**43,100**	**43,100**	**43,100**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Financial Analysis

The financial analysis table is organized using columns and rows that show different fiscal years and line item revenues and expenditures. The far left column lists the titles for line item revenues and expenditures followed to the right by audited data for FY 2008-2012 and estimated data for FY 2013. Using the historical trends and knowledge of the Town's future plans, the next ten columns depict the projected revenues and expenditures for the next ten fiscal years.

Each row represents either a revenue or expenditure, taken from the headings used in the audit. The rows in the upper half of the table contain current revenue sources followed by expenditures in the lower half of the table. The rows near the bottom show the net income and the unrestricted net assets, which are the result of deducting all expenditures from revenues each year. Also shown at the bottom of the table are new debt issuance assumptions in certain fiscal years when debt is proposed to help finance capital projects from the CIP.

The water and sewer funds have been prudently operated for over the last five years. Except for water fund losses in FY 2008 and 2009, each fund has generated positive net incomes before accruals. In addition, unrestricted net assets are adequate and exceed the minimum levels mandated by the Local Government Commission.

In conducting the financial analysis, we gathered the Town's audited financial statements from FY 2008 through FY 2012 along with the Year-end report and budget for FY 2013. Capital outlays were separated to ensure the figures used for projections were consistent with prior years. Historical trends for each of the line items were analyzed to anticipate how each revenue and expenditure would change over the next ten years. After calculating the growth trends, we projected that water and sewer revenues would grow by an annual average rate of 1% as seen in the financial analysis in Table 20. Regarding expenditures, we projected that Administration expense would grow by an average rate of 5%, Salaries and Benefits and Water Maintenance Supplies would grow by 4%, and Utilities would grow by 3%, and all other expenses grow by 2%. Transfers out to the general fund are projected by Town staff to be 4% of revenues.

The analysis assumes that the Town will annex the Lake Junaluska Assembly on July 1, 2013. The effect of the annexation upon the water and sewer funds is increases to both user revenues and operating expenditures. The water and sewer funds will realize revenue increases of $55,000 and $4600 respectively in FY 2014. Water and sewer expenditures will increase by $170,000 and $159,250 respectively due to the hiring of three employees and increased maintenance costs. Details are shown in the Lake Junaluska Annexation study.

In order to maintain a positive net income with large capital improvement projects, the analysis assumes that funds will be acquired by borrowing capital. Debt issuance is packaged and spaced in time to avoid debt service stacking that is unnecessarily burdensome on the funds. The remaining yearly capital requirements over the next ten

TABLE 20
TOWN OF WAYNESVILLE
FINANCIAL ANALYSIS WITH LJA ANNEXATION
WATER AND SEWER FUNDS

LINE ITEM	AUDIT 2008	AUDIT 2009	AUDIT 2010	AUDIT 2011	AUDIT 2012	ESTIMATE 2013	YEAR 1 2014	YEAR 2 2015	YEAR 3 2016	YEAR 4 2017	YEAR 5 2018	YEAR 6 2019	YEAR 7 2020	YEAR 8 2021	YEAR 9 2022	YEAR 10 2023
WATER																
REVENUES:																
WATER CHARGES	1,991,861	2,131,360	2,210,793	2,283,210	2,389,711	2,649,000	2,675,490	2,702,245	2,729,267	2,756,560	2,784,126	2,811,967	2,840,087	2,868,487	2,897,172	2,926,144
NET LJA REVENUE							55,000	55,550	56,106	56,667	57,233	57,806	58,384	58,967	59,557	60,153
WATER TAPS	81,240	47,300	32,403	32,350	36,050	30,000	30,300	30,603	30,909	31,218	31,530	31,846	32,164	32,486	32,811	33,139
NONOPERATING INCOME:																
INVESTMENT INCOME	39,108	8,397	1,257	234	0	300	1,000	1,000	2,000	2,000	2,000	1,000	2,000	2,000	2,000	2,000
DEVELOPERS AND GOVERNMENT CONTRIBUTIONS																
ELECTRIC FUND				97,250												
MISCELLANEOUS	14	12,112	1,714	113	6,873	17,000	8,000	8,080	8,161	8,242	8,325	8,408	8,492	8,577	8,663	8,749
TOTAL REVENUES	2,112,223	2,199,169	2,246,167	2,413,157	2,432,634	2,696,300	2,769,790	2,797,478	2,826,443	2,854,687	2,883,214	2,911,026	2,941,126	2,970,518	3,000,203	3,030,185
NEW SOURCES OF REVENUE:																
REVENUE FROM WATER RATE INCREASE							81,915	167,950	258,279	353,085	452,555	556,886	666,283	672,945	679,675	686,472
PERCENTAGE INCREASE							3%	3%	3%	3%	3%	3%	3%			
TOTAL REVENUES	2,112,223	2,199,169	2,246,167	2,413,157	2,432,634	2,696,300	2,851,705	2,965,428	3,084,722	3,207,772	3,335,769	3,467,912	3,607,409	3,643,463	3,679,878	3,716,656
EXPENDITURES:																
WATER ADMINISTRATION																
GENERAL FUND	181,930	202,280	180,860	200,000	218,612	216,000	226,800	238,140	250,047	262,549	275,677	289,461	303,934	319,130	335,087	351,841
WATER MAINTENANCE																
SALARIES AND BENEFITS	387,430	407,732	406,833	406,606	405,005	393,000	408,720	425,069	442,072	459,754	478,145	497,270	517,161	537,848	559,362	581,736
SALARIES AND BENEFITS - LJA							90,000	93,600	97,344	101,238	105,287	109,499	113,879	118,434	123,171	128,098
SUPPLIES	113,326	155,191	161,911	121,444	196,958	213,000	221,520	230,381	239,596	249,180	259,147	269,513	280,293	291,505	303,165	315,292
PROFESSIONAL SERVICES	2,329	22,056	5,533	0	0	0	5,000	5,100	5,202	5,306	5,412	5,520	5,631	5,743	5,858	5,975
MAINTENANCE AND REPAIRS - LJA							80,000	82,400	84,872	87,418	90,041	92,742	95,524	98,390	101,342	104,382
OTHER	140,712	137,933	112,513	136,078	150,957	141,000	143,820	146,696	149,630	152,623	155,675	158,789	161,965	165,204	168,508	171,878
WATER OPERATIONS																
SALARIES AND BENEFITS	364,855	395,813	403,496	415,531	405,955	454,000	472,160	491,046	510,688	531,116	552,360	574,455	597,433	621,330	646,184	672,031
PROFESSIONAL SERVICES	30,787	22,468	17,363	8,111	11,948	7,000	7,140	7,283	7,428	7,577	7,729	7,883	8,041	8,202	8,366	8,533
UTILITIES	14,771	18,437	17,484	16,343	16,725	14,000	14,420	14,853	15,298	15,757	16,230	16,717	17,218	17,735	18,267	18,815
SUPPLIES	138,694	196,096	141,625	150,245	149,460	116,000	118,320	120,686	123,100	125,562	128,073	130,635	133,248	135,912	138,631	141,403
OTHER	84,584	69,884	76,695	86,487	83,093	113,000	114,130	115,271	116,424	117,588	118,764	119,952	121,151	122,363	123,586	124,822
TOTAL OPERATING EXPENDITURES	1,459,418	1,627,890	1,524,313	1,540,845	1,638,713	1,667,000	1,902,030	1,970,526	2,041,702	2,115,669	2,192,540	2,272,435	2,355,478	2,441,796	2,531,526	2,624,807
CAPITAL OUTLAY	519,622	357,358	250,993	314,320	184,709	798,000	430,500	628,600	632,700	581,800	740,000	467,200	513,400	533,600	541,000	826,400
TRANSFER TO GENERAL FUND	52,450	74,420	91,950	97,250	103,100	103,000	114,000	118,000	123,000	128,000	133,000	138,000	144,000	145,000	147,000	148,000
EXISTING DEBT	297,481	323,114	323,115	333,273	359,329	302,988	242,776	173,006	137,074	110,089	108,756	107,387	106,037	104,687	77,279	75,929
NEW DEBT									122,832	245,664	245,664	245,664	310,641	375,619	375,619	375,619
TOTAL EXPENDITURES	2,328,971	2,382,782	2,190,371	2,285,688	2,285,851	2,870,988	2,689,306	2,890,131	3,057,308	3,181,222	3,419,960	3,230,687	3,429,556	3,600,702	3,672,424	4,050,755
REVENUES OVER EXPENDITURES	-216,748	-183,613	55,796	127,469	146,783	-174,688	162,399	75,297	27,414	26,550	-84,191	237,225	177,853	42,761	7,453	-334,099
ACCRUAL ADJUSTMENTS	319,035	646,105	624,501	220,976	192,410											
NET INCOME	102,287	462,492	680,297	348,445	339,193	-174,688	162,399	75,297	27,414	26,550	-84,191	237,225	177,853	42,761	7,453	-334,099
UNRESTRICTED NET ASSETS	1,016,909	1,135,203	1,240,558	1,361,398	1,448,256	1,273,568	1,435,967	1,511,263	1,538,677	1,565,227	1,481,035	1,718,261	1,896,114	1,938,874	1,946,328	1,612,229
UNRESTRICTED NET ASSETS / TOTAL EXPENDITURES	43.66%	47.64%	56.64%	59.56%	63.36%	44.36%	53.40%	52.29%	50.33%	49.20%	43.31%	53.19%	55.29%	53.85%	53.00%	39.80%
NEW DEBT:																
LOAN AMOUNT									2,751,000				1,360,000			
PAYMENT									122,832				64,978			
ANNUAL PAYMENTS									245,664				129,955			
RATE									4.0%				5.0%			
TERM									15				15			

TABLE 20
TOWN OF WAYNESVILLE
FINANCIAL ANALYSIS WITH LJA ANNEXATION
WATER AND SEWER FUNDS

LINE ITEM	AUDIT 2008	AUDIT 2009	AUDIT 2010	AUDIT 2011	AUDIT 2012	ESTIMATE 2013	YEAR 1 2014	YEAR 2 2015	YEAR 3 2016	YEAR 4 2017	YEAR 5 2018	YEAR 6 2019	YEAR 7 2020	YEAR 8 2021	YEAR 9 2022	YEAR 10 2023
SEWER																
REVENUES:																
SEWER CHARGES	1,840,185	1,928,124	1,902,679	1,889,552	1,874,888	2,095,000	2,115,950	2,137,110	2,158,481	2,180,065	2,201,866	2,223,885	2,246,124	2,268,585	2,291,271	2,314,183
NET LJA REVENUE							4,600	4,650	4,701	4,752	4,803	4,855	4,908	4,961	5,014	5,068
SEWER TAPS	52,782	57,050	21,000	40,050	36,124	12,000	12,120	12,241	12,364	12,487	12,612	12,738	12,866	12,994	13,124	13,255
IMPACT FEES	1,920	1,920	0	0	0	10,000	10,100	10,201	10,303	10,406	10,510	10,615	10,721	10,829	10,937	11,046
INDUSTRIAL DISCHARGE PERMITS	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NONOPERATING INCOME:																
INVESTMENT INCOME	22,065	7,689	1,777	607	0	0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
DEVELOPERS AND GOVERNMENT CONTRIBUTIONS							40,000	730,000	65,000							
TRANSFER FROM GENERAL FUND																
MISCELLANEOUS	1,923	541	983	15,000	6,095	320	323	326	330	333	336	340	343	347	350	353
TOTAL REVENUES	1,919,075	1,995,324	1,926,439	1,945,209	1,917,107	2,117,320	2,184,093	2,895,528	2,252,177	2,209,043	2,231,128	2,253,433	2,275,961	2,298,715	2,321,696	2,344,907
NEW SOURCES OF REVENUE:																
REVENUE FROM SEWER RATE INCREASE							190,850	286,139	387,088	493,991	607,156	726,907	853,586	987,550	1,129,176	1,278,858
PERCENTAGE INCREASE							9%	4%	4%	4%	4%	4%	4%	4%	4%	4%
TOTAL REVENUES	1,919,075	1,995,324	1,926,439	1,945,209	1,917,107	2,117,320	2,374,943	3,181,667	2,639,266	2,703,034	2,838,283	2,980,340	3,129,547	3,286,265	3,450,872	3,623,765
EXPENDITURES:																
SEWER ADMINISTRATION																
GENERAL FUND	165,320	181,720	166,730	171,580	179,293	184,000	193,200	202,860	213,003	223,653	234,836	246,578	258,906	271,852	285,444	299,717
SEWER MAINTENANCE																
SALARIES AND BENEFITS	223,042	237,414	226,287	218,767	179,282	202,000	210,080	218,483	227,223	236,311	245,764	255,594	265,818	276,451	287,509	299,009
SALARIES AND BENEFITS - LJA							45,000	46,800	48,672	50,619	52,644	54,749	56,939	59,217	61,586	64,049
PROFESSIONAL SERVICES		8,384	0	0	135	0	0	0	0	0	0	0	0	0	0	0
MATERIALS		31,224	37,913	40,822	43,907	33,000	34,650	36,383	38,202	40,112	42,117	44,223	46,434	48,756	51,194	53,754
MAINTENANCE AND REPAIRS - LJA							114,250	117,678	121,208	124,844	128,589	132,447	136,420	140,513	144,728	149,070
OTHER	84,294	51,030	35,260	36,328	32,523	46,000	46,920	47,858	48,816	49,792	50,788	51,803	52,840	53,896	54,974	56,074
SEWER OPERATIONS																
SALARIES AND BENEFITS	493,443	520,651	525,243	533,984	551,860	583,000	606,320	630,573	655,796	682,028	709,309	737,681	767,188	797,876	829,791	862,982
PROFESSIONAL SERVICES	10,287	11,205	20,770	11,777	9,881	6,000	6,120	6,242	6,367	6,495	6,624	6,757	6,892	7,030	7,171	7,314
UTILITIES	176,146	171,307	165,869	192,045	167,465	159,000	162,180	165,424	168,732	172,107	175,549	179,060	182,641	186,294	190,020	193,820
SUPPLIES	121,981	93,521	83,216	66,702	68,940	54,000	55,080	56,182	57,305	58,451	59,620	60,813	62,029	63,270	64,535	65,826
OTHER	75,817	92,012	86,228	71,324	66,170	86,000	87,720	89,474	91,264	93,089	94,951	96,850	98,787	100,763	102,778	104,834
TOTAL OPERATING EXPENDITURES	1,350,330	1,398,468	1,347,516	1,343,329	1,299,456	1,353,000	1,561,520	1,617,956	1,676,587	1,737,500	1,800,791	1,866,556	1,934,896	2,005,917	2,079,730	2,156,448
CAPITAL OUTLAY	346,011	302,806	307,075	411,935	153,793	450,000	609,200	1,426,200	837,300	778,000	652,700	650,400	671,300	659,200	671,200	645,300
TRANSFER TO GENERAL FUND	49,400	70,180	83,070	81,700	77,930	77,000	93,000	98,000	103,000	108,000	113,000	119,000	125,000	131,000	138,000	145,000
EXISTING DEBT	129,738	129,738	41,156	83,042	41,891	43,100	43,100	43,100	0	0	0	0	0	0	0	0
NEW DEBT									59,608	119,215	224,319	329,422	417,238	505,053	505,053	505,053
TOTAL EXPENDITURES	1,875,479	1,901,192	1,778,817	1,920,006	1,573,070	1,923,100	2,306,820	3,185,256	2,676,494	2,742,716	2,790,810	2,965,378	3,148,433	3,301,170	3,393,982	3,451,801
REVENUES OVER EXPENDITURES	43,596	94,132	147,622	25,203	344,037	194,220	68,123	-3,589	-37,229	-39,682	47,474	14,962	-18,886	-14,905	56,889	171,964
ACCRUAL ADJUSTMENTS	54,305	8,525	-70,599	54,899	-267,199											
NET INCOME	97,901	102,657	77,023	80,102	76,838	194,220	68,123	-3,589	-37,229	-39,682	47,474	14,962	-18,886	-14,905	56,889	171,964
UNRESTRICTED NET ASSETS	685,255	772,011	1,107,224	1,125,126	1,448,459	1,642,679	1,710,802	1,707,212	1,669,984	1,630,302	1,677,776	1,692,738	1,673,852	1,658,947	1,715,836	1,887,800
CUMULATIVE EARNINGS / TOTAL EXPENDITURES	36.54%	40.61%	62.24%	58.60%	92.08%	85.42%	74.16%	53.60%	62.39%	59.44%	60.12%	57.08%	53.16%	50.25%	50.56%	54.69%
NEW DEBT:																
LOAN AMOUNT									1,335,000		2,275,000		1,838,000			
PAYMENT									59,608		105,104		87,815			
ANNUAL PAYMENTS									119,215		210,207		175,631			
RATE									4.0%		4.5%		5.0%			
TERM									15		15		15			

years will be paid by annual capital outlays that range from $408,800 in FY 2017 to $764,600 in FY 2015 for water and range from $569,200 in FY 2014 to $778,000 in FY 2017 for sewer. The planned methods to finance the improvements in the CIP are shown in Table 21.

TABLE 21
TOWN OF WAYNESVILLE
WATER AND SEWER DEBT PACKAGES

YEAR	FUND	PRINCIPAL	YEARLY PAYMENT	RATE	TERM (YEARS)
2016	SEWER	$1,335,000	$119,215	4%	15
2016	WATER	$2,751,000	$245,664	4%	15
2018	SEWER	$2,275,000	$210,207	4.5%	15
2020	SEWER	$1,838,000	$175,631	5%	15
2020	WATER	$1,360,000	$129,955	5%	15

When including the debt packages and reserve contributions into the financial analysis, we concluded that the water fund's net income would remain positive over seven of the next 10 years at a 10-year annual average of $35,500 if proposed rate increases are implemented. An unrestricted net assets amount of $1,628,000 is achieved by Year 10. The sewer fund's net income would remain positive over five of the next 10 years at a 10-year annual average of $24,500 if its proposed rate increases are implemented. An unrestricted net assets amount of $1,887,000 is achieved by Year 10. As discussed next, the proposed rate increases over the next 10 years are high enough to yield feasible operations for each enterprise fund, yet not so high as to create excessive cumulative balances.

WATER AND SEWER REVENUE RECOMMENDATIONS

As a result of our analysis, we have modeled the following water and sewer revenue increases from all water and sewer users. These increases would only affect fixed and volume charges but not tap, impact, or miscellaneous fees. These revenue increases are arranged in time to minimize the impact to most users as shown below and in the financial analysis table.

- 3% annual water revenue increases from FY 2014 – 2019.
- 9% increase in FY 2014 and 4% annual sewer revenue increases from FY 2015 – 2023.

CONCLUSIONS

Over past decades considerable investments have been made by the Town of Waynesville in water and sewer infrastructure. These investments have yielded a vast set of capital infrastructure assets throughout the Town and adjacent areas. However, a service area with the potential for much change is downtown Waynesville. Many of the lines in the center of Waynesville are likely near the end of their useful lives and system failures should be expected unless preventive maintenance or replacements are performed. Detailed conditions of these lines are not completely known nor tracked, so it is not possible to accurately gauge when failure in this area will occur. This plan is a useful tool to better anticipate failures and direct maintenance funds where they are needed most.

Reactive, emergency maintenance is typically the most expensive type of maintenance and should make up a minimal amount of total maintenance effort. Instead, time based preventive and/or predictive strategies should comprise the most of the effort. Some assets, especially very dynamic assets, such as pump stations can leave discernable clues as to their capacity to perform. When determining the most cost effective maintenance strategy for a given asset, the likelihood of failure and the consequence of failure should be considered. Operating to failure may be the most cost-effective maintenance strategy for a given asset, but only when coupled with a carefully developed failure response plan.

Because the Town's needs change over time, this Asset Management Plan is a living document and should be reviewed annually and updated at least every three years. It will further develop as additional information about the Town's water and sewer assets is collected in terms of condition, performance and service delivery. For example, basic data is not available for the oldest lines in the downtown area. Additional information about this infrastructure such as the years of pipe installation would be beneficial. However, the effectiveness of the water and sewer Asset Management Plan should be monitored in various ways and the results used in the updating and revision of the plan. For example, the cost of gathering appropriate condition data is a fundamental issue, especially for buried infrastructure where intervention can have significant operational consequences in terms of closing down the system to facilitate access.

Asset management is a continual planning process that should be integrated with all other planning efforts. This Asset Management Plan will act as a source of information from which other plans can utilize and as a vehicle for the development of advanced asset management practices in the future, which will allow improved decision making techniques.

APPENDICES

WATER LINE DATA

TOWN OF WAYNESVILLE
LINEAR FEET OF WATER LINES BY DIAMETER AND INSTALL DECADE

Sum of LENGTH	DIAMETER												
DECADE	2	3	4	6	8	10	12	14	16	18	20	24	Grand Total
1920's			28,789	44,334	1,359	8,169		8,181					90,833
1930's													
1940's				6,823		2,334	447						9,604
1960's	64,470	506	31,493	106,647	21,768	12,763	5,634	170	6,387		3,500	18,123	271,462
1970's	19,426			11,994	10,479							646	42,545
1980's	3,386		2,419	39,757	10,417						401		56,381
1990's	27,223		10,523	58,071	16,054	2,163	8,211						122,244
2000's	30,292		8,531	34,171	20,305		16,301			2,788			112,388
2010's	29,365		6,905	3,220	3,775	2,860							46,125
Grand Total	174,162	506	88,660	305,018	84,158	28,290	30,593	8,350	6,387	2,788	3,901	18,770	751,583

TOWN OF WAYNESVILLE
LINEAR FEET OF WATER LINES BY MATERIAL AND INSTALL DECADE

Sum of LENGTH	MATERIAL							
DECADE	Asbestos	Cast Iron	Ductile Iron	Galvanized Iron	HDPE	Polyvinyl Chloride	Unknown	Grand Total
1920's		90,833						90,833
1930's								
1940's		9,604						9,604
1960's	3,125	187,849	12,585	64,503		3,400		271,462
1970's		3,443	18,279	19,131		1,692		42,545
1980's		9,378	21,978			25,024		56,381
1990's		4,287	54,494			63,462		122,244
2000's			64,223			27,885	20,280	112,388
2010's			14,580		1,400		30,145	46,125
Grand Total	3,125	305,395	186,140	83,635	1,400	121,463	50,425	751,583

SEWER LINE DATA

TOWN OF WAYNESVILLE
LINEAR FEET OF SEWER LINES BY DIAMETER AND INSTALL DECADE

Sum of LENGTH	DIAMETER										
DECADE	4	6	8	10	12	15	16	18	24	30	Grand Total
1930's			82.48						5,957.88		6,040.36
1940's	9,006.43	140,943.62	119,441.45	3,436.17	20,416.89	5,364.85		1,444.44	7,053.48	8,381.39	315,488.71
1960's	397.02	12,064.27	6,849.04						1,833.49		21,143.83
1970's		6,484.71	12,863.61	2,146.66	78.41	2,482.02		13,787.44	1,045.88	3,642.87	42,531.59
1980's		3,943.07	27,966.97	1,985.70	1,194.78	400.71	235.33		1,716.23		37,442.78
1990's		2,625.77	39,962.28	10,940.81	1,073.13			609.15			55,211.13
2000's		500.43	30,931.52		23,367.93	1,100.00			1,828.29		57,728.17
2010's			11,291.00								11,291.00
Grand Total	9,403.45	166,561.86	249,388.35	18,509.33	46,131.13	9,347.59	235.33	15,841.02	19,435.25	12,024.25	546,877.56

TOWN OF WAYNESVILLE
LINEAR FEET OF SEWER LINES BY MATERIAL AND INSTALL DECADE

Sum of LENGTH	MATERIAL						
DECADE	Asbestos	Cast Iron	CIPP	Ductile Iron	Polyvinyl Chloride	Vitrified Clay	Grand Total
1930's						6,040.36	6,040.36
1940's	708.89	1,492.35		3,421.73	7,534.84	302,330.91	315,488.71
1960's				1,192.26	1,051.94	18,899.63	21,143.83
1970's	78.41	190.00		84.06	2,257.31	39,921.82	42,531.59
1980's				898.08	30,387.44	6,157.26	37,442.78
1990's		523.78		4,005.77	48,266.05	2,415.53	55,211.13
2000's			1,828.29	22,217.92	31,850.85	1,831.10	57,728.17
2010's					11,291.00		11,291.00
Grand Total	787.30	2,206.12	1,828.29	31,819.81	132,639.43	377,596.60	546,877.56