CITY OF MARLIN

VOLUME III

WASTEWATER TREATMENT PLANT ASSET MANAGEMENT PLAN

(FALLS COUNTY, TEXAS)

Prepared by:

KSA Engineers, Inc.
(TBPE Firm Registration No. F-1356)
4833 Spicewood Springs Road
Suite 204
Austin, TX 78759
Telephone: 512.342.6868
www.ksaeng.com

Table of Contents

List of Tables

List of Figures

List of Appendixes

INTRODUCTION

This report is Volume III of a three part study completed for the City of Marlin under a grant from the Heart of Texas Council of Governments. This study was initiated after discussions with city administration and operators who indicated that the water and wastewater treatment plants have significant annual expenses. The body of the report presents an overview of the findings from site visits and discussions with the operators, while the attachments and appendixes provide resources for regular use.

A. Study Authority

This study was completed under a grant from the Heart of Texas Council of Governments (HOTCOG). KSA Engineers was authorized to complete this work under Task Order No. MAR.043 City of Marlin Water and Wastewater Treatment Plant Efficiency Study, executed on February 19, 2015. This study will be incorporated into the larger grant project completed by HOTCOG.

B. Study Overview

The purpose of this study is to determine the following items as outlined in the EPA Best Practices Guide: the current state of the Marlin water system components, the required "sustainable" level of service, which assets are critical to sustained performance, the minimum life cycle costs, and the best long-term funding strategy. The components investigated under this Asset Management Plan include eight major wastewater treatment assets:

1. Headworks
2. Aeration System
3. Aerated Lagoon 1
4. Aerated Lagoon 2
5. Polishing Pond 1
6. Polishing Pond 2
7. Discharge Line and Structure
8. WWTP Site Infrastructure

This study was based on the Best Practices Guide by the Environmental Protection Agency (EPA). This guide outlines five core pieces of asset management: Current State of Assets, Level of Service, Critical Assets, Minimum Life Cycle Cost, and Long-Term Funding Plan, all of which were used in this study. Each section answers specific questions outlined by the EPA which are directed towards better asset management of

the key components in the water system. The EPA document, *Asset Management: A Best Practices Guide* is provided in Appendix A for reference.

SECTION I
CURRENT STATE OF ASSETS

This section presents an overview of the existing assets owned and operated by Marlin at the wastewater treatment plant (WWTP). The best practices for this area of asset management includes the following:

- Preparing an asset inventory
- Developing a condition assessment and rating system
- Assessing remaining useful life by consulting projected-useful-life tables or decay curves
- Determining asset values and replacement costs

This section first outlines the approach used to investigate the current state of assets; the last section presents an overview of the findings. The detailed asset summary is included in Appendix B and should be consulted for full details on each asset. A summary of the findings is presented in this section.

A. Approach to Investigating Current State of the Assets

An inventory of assets was first completed by reviewing the WWTP plans and completing a site visit to the plant. The assets were divided into eight major asset groups. Each asset was further divided into major components. For the wastewater treatment plant, each asset ID starts with “WW”. Each asset is given a number with sub-assets further divided out. An example of the numbering system is shown below.

2 - Aeration System
2.1 - EDI Aeration/ Mixing System
2.1.1 - Anchors and Ropes

Some assets are considered as a whole, such as the Aeration System, while others were broken down into their components such as the anchors and ropes. While this study divided the assets into major groups and their sub-assets, further divisions can be made at a later date. It is this study’s intent to identify the major asset components that have similar conditions, criticality, and remaining life.

Each asset is assessed based on condition, remaining useful life, and asset value/ replacement cost. A recommendation was given based on these factors.

Developing a Condition Assessment and Rating System

The condition assessment is based on the degree of deterioration and loss in functionality that each asset exhibits. The condition assigned to each asset is based on engineering judgement from site visits along with discussions with the operators. Due to the limited timeframe for this study, not all equipment was able to be observed in operation. These condition rates should not take the place of regular inspections but are intended to present an overall condition assessment that is useful for developing short-range goals and long-range planning. The rating system is outlined in Table 1.

Table 1. Condition Assessment Rating System

A - Excellent	No noticeable defects or problems, fully functional
B - Good	Minor deterioration, only slight deterioration in functionality
C - Fair	Partial deterioration, but function not greatly affected
D - Poor	Significant deterioration, function inadequate or failure potential
F - Failed	Partial or complete failure, asset not functional

The condition assessment is divided into five categories with an associated letter. The letter's A through F can is similar to a grade given in school. A-Excellent and B-Good are assigned to assets that are performing well in the field and do not need any immediate attention. Assets assigned a C-Fair and D-Poor have exhibited deterioration that affects performance. Repair or replacement may be necessary in the short term for assets with a fair or poor condition. A failed asset is completely non-functional and no longer used in operations.

Assessing Remaining Useful Life

The remaining useful life of each asset was determined using engineering judgement and knowledge on infrastructure life cycle. The wastewater treatment plant is comprised of structures, pipes, mechanical equipment, buildings, and site improvements. The following are general comments on infrastructure life spans:

- *Mechanical Equipment*: Well-maintained mechanical equipment can last 15-20 years before it needs to be completely replaced.
- *Electrical and Controls*: Electrical and control systems typically have the same life cycle as the associated mechanical equipment (15-20 years). It is most efficient to replace the mechanical equipment and electrical and controls at the same time.

- *Concrete Structures*: Most concrete structures can be considered long-term assets as long as structural defects are addressed soon after discovery.
- *Buildings*: Most buildings may be as considered long-term assets if well maintained.

This report uses the term "Long-Term Asset" for any asset that has a life span greater than 30 years. For a long-term asset to truly last for the long term, regular maintenance activities must be completed. Failing to complete maintenance or addressing deficiencies may significantly shorten a long-term assets life span.

Determining Asset Values and Replacement Costs

Each asset is assigned an asset value and replacement/rehabilitation cost. This cost is not the asset construction cost but instead is the anticipated major expenditure required when the asset reaches the end of its useful life. For further details on the assigned cost, refer to the associated recommendations for unit. The costs presented in this study are based on engineering judgement and are intended for *long-term* planning purposes. Any projects that are recommended in the next three years should have a detailed opinion of probable project cost completed. These costs are presented in 2015 dollars and will need to be inflation adjusted as time progresses.

B. Wastewater Treatment Plant Asset Inventory

City of Marlin operates a wastewater treatment plant located approximately 2.5 miles southwest of the intersection of State Highway 6 and State Highway 712 in Falls County. The plant discharges via pipe directly to the Brazos River. The existing Marlin WWTP has an average annual flow not to exceed 2.0 million gallons per day (MGD). The plant was built in the 1960s and was converted into a lagoon plant in the 1980's; sludge removal improvements were completed in 1992 and 2008. Subsequent aeration improvements were completed in 2009. Table 2 shows the current condition assessment for the assets at the wastewater treatment plant.

Table 2. Wastewater Treatment Plant Inventory and Condition Assessment

ID	Asset Name	Condition Rating	Estimated Remaining Life	Asset Value and Replacement/ Rehabilitation Cost
WW 1	**Headworks**	**B - Good**	**15 years**	**$282,500**
WW 1.1	Bar Screen Concrete Structure	B - Good	Long Term Asset	Long Term Asset
WW 1.2	Bar Screen Hydraulic Gates	B - Good	25 years	$50,000
WW 1.3	Mechanical Bar Screen	B - Good	15 years	$200,000
WW 1.4	Manual Bar Screen	B - Good	25 years	$7,500
WW 1.5	Mechanical Bar Screen Electrical and Controls	B - Good	15 years	$25,000
WW 2	**Aeration System**	**B - Good**	**15 years**	**$800,000**
WW 2.1	EDI Aeration/Mixing System	B - Good	15 years	$500,000
WW 2.1.1	Anchors and Ropes	B - Good	8 years	$50,000
WW 2.1.2	Air Laterals and Feeder Airline	B - Good	15 years	$300,000
WW 2.1.3	Air Diffuser	B - Good	15 years	$150,000
WW 2.2	Blowers	B - Good	15 years	$150,000
WW 2.3	Blower Controls and Electrical	B - Good	15 years	$50,000
WW 2.4	DI Air Piping	B - Good	40 years	$100,000
WW 3	**Aerated Lagoon 1**	**C - Fair**	**5 years**	**$200,000**
WW 3.1	Aerated Lagoon 1 (Basin)	C - Fair	5 years	$150,000
WW 3.2	Aerator 1 Berm	C - Fair	Long Term Asset	N/A
WW 3.3	Aerator 1 Hydraulic Structures	B - Good	Long Term Asset	N/A
WW 3.4	Aerator 1 Baffle	B - Good	15 years	$50,000
WW 4	**Aerated Lagoon 2**	**C - Fair**	**5 years**	**$200,000**
WW 4.1	Aerated Lagoon 2 (Basin)	C - Fair	5 years	$150,000
WW 4.2	Aerator 2 Berm	B - Good	Long Term Asset	N/A
WW 4.3	Aerator 2 Hydraulic Structures	B - Good	Long Term Asset	N/A
WW 4.4	Aerator 2 Baffle	B - Good	15 years	$50,000
WW 5	**Polishing Pond 1**	**C - Fair**	**10 years**	**$300,000**
WW 5.1	Polishing Pond 1 (Basin)	C - Fair	10 years	$300,000
WW 5.2	Polishing Pond 1 Berm	C - Fair	Long Term Asset	N/A
WW 5.3	Polishing Pond 1 Hydraulic Structures	B - Good	Long Term Asset	N/A
WW 6	**Polishing Pond 2**	**C - Fair**	**10 years**	**$300,000**
WW 6.1	Polishing Pond 2 (Basin)	C - Fair	10 years	$300,000
WW 6.2	Polishing Pond 2 Berm	C - Fair	Long Term Asset	N/A

ID	Asset Name	Condition Rating	Estimated Remaining Life	Asset Value and Replacement/ Rehabilitation Cost
WW 6.3	Polishing Pond 2 Hydraulic Structures	B - Good	Long Term Asset	N/A
WW 7	**Discharge Line and Structure**	**B - Good**	**10 years**	**$30,000**
WW 7.1	Discharge Pipe/Channel	B - Good	Long Term Asset	N/A
WW 7.2	Parshall Flume	B - Good	15 years	$30,000
WW 8	**WWTP Site Infrastructure**	**B - Good**	**15 years**	**$230,000**
WW 8.1	Office/Lab	B - Good	15 years	$50,000
WW 8.2	Grinder Lift Station	B - Good	15 years	$50,000
WW 8.3	Gravel Drive	B - Good	15 years	$40,000
WW 8.4	Barbed Wire Fencing	B - Good	15 years	$60,000
WW 8.5	Chain Link Fencing	B - Good	15 years	$30,000

C. Recommendations from Inventory Assessment

The inventory assessment indicates that the components installed in the 2009 project remain in good condition. Since the treatment plan is a lagoon type treatment plant, one major concern is the accumulation of sludge in the treatment units. From discussions with the operators, the aerated lagoons have potentially accumulated sludge and need to be cleaned out. Since the polishing ponds have had sludge removal completed in 2008, it may be as long as 10 years before they need to be cleaned out again. There are no poor condition or failed assets at the WWTP.

Many of the assets were given a 15-year life span. Therefore, it is possible that a major infrastructure upgrade project at the WWTP would need to occur around 2030.

SECTION II
LEVEL OF SERVICE

This section presents an overview of the existing level of service needed to properly maintain the treatment plant and serve the community with efficient and cost-effective wastewater processing. The best practices for this section include the following:

- Analyzing current and anticipated customer demand and satisfaction with the system
- Understanding current and anticipated regulatory requirements
- Using level of service standards to track system performance over time

A. Approach for Investigating Current Level of Service

The level of service includes the manner that the infrastructure must be operated to satisfy customer demands. The level of service at a wastewater treatment plant should include the following:

1. WWTP operations should meet or exceed all State and Federal regulations, rules, and permits.
2. The WWTP should be run in a cost-efficient manner that minimizes the costs to process a gallon of water.
3. The WWTP should not produce nuisance odors that inhibit the use and enjoyment of another's property.
4. The WWTP should operate in a safe manner.

This asset management study approaches level of service from a holistic plant perspective along with stating the level of service needed for each major asset. Performance measures and targets are recommended for the city to track key items. By tracking specific measures, deficiencies can be identified.

B. General Customer Satisfaction Level of Service

From the level of service aims listed above, performance metrics were developed. It is recommended that the city track these items on an annual basis to monitor overall plant performance. The treatment plant level of service performance metrics are recommended as follows.

- *Cost per million gallons wastewater processed:* The cost per million gallons to process wastewater

- *Maintenance cost per year:* The cost per year to maintain the assets at the WWTP
- *Chemical cost per year:* The amount spent in chemicals per year at the WWTP
- *Operator safety events per year:* Number of times per year that operators are subjected to unsafe events
- *Hours of overtime per year due to treatment plant emergencies:* The number of hours of overtime needed each year to have the distribution system working properly

Each major asset was given a specific level of service. Since all units are important for the treatment plant operations, the level of service for many of the assets is stated as the requirement to keep the asset operational at all times. Table 3 shows the level of service for each asset.

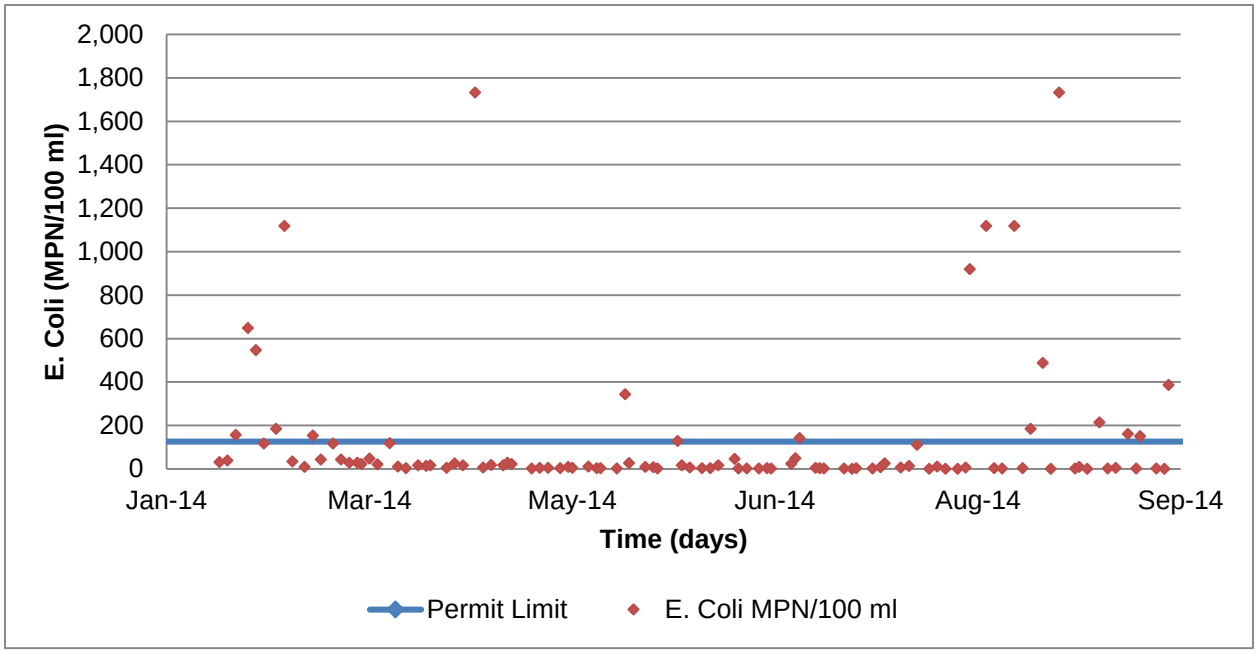
Table 3. Asset Group Level of Service

ID	Asset Name	Level of Service
WW 1	Headworks	Keep headworks operational 100% of the time with the mechanical bar screen used as the primary screening unit
WW 2	Aeration System	Keep aeration system operational at all times
WW 3	Aerated Lagoon 1	Keep Aerated lagoon 1 operational at all times
WW 4	Aerated Lagoon 2	Keep Aerated Lagoon 2 operational at all times
WW 5	Polishing Pond 1	Keep Polishing Pond 1 operational at all times
WW 6	Polishing Pond 2	Keep Polishing Pond 2 operational at all times
WW 7	Discharge Line and Structure	Keep discharge line operational at all times
WW 8	WWTP Site Infrastructure	Maintain support infrastructure to allow for efficient wastewater treatment operations

C. Current Level of Service Deficiencies

In reviewing the wastewater treatment plant operational logs, deficiencies were found with the disinfection because the E. coli permit limit is exceeded. The permit requires the plant to have a daily average E. coli of 126 MPN/100 ml and a daily max of 399 MPN/100 ml. Figure 1 graphs the E. coli tests for the treatment plant in 2014. For the plant to not exceed the permit requirements, disinfection will need to be implemented at the plant. It is recommended that the city pursue funding sources to implement disinfection treatment. Anticipated cost is $500,000.

Figure 1. E. Coli Tests for Treated Wastewater



SECTION III
CRITICAL ASSETS

This section presents an overview of the criticality ratings given to each asset. These ratings were determined based on how important the asset is to plant operations and performance. The best management practices for this section include listing assets according to how critical they are to system operations, analyzing failure risk and consequences, and reviewing and updating the system's vulnerability assessment.

The detailed asset summary is included in Appendix B and should be consulted for full details on each asset's criticality. A summary of the findings is presented in this section.

A. Developing a Criticality Assessment Rating System

A system has been developed to determine how critical each asset is to the overall treatment plant operations. By using this rating system, the city can determine the unit's importance to the overall treatment scheme. In general, non-essential assets are available to benefit the operations, but the plant will remain functional without these components or units. Highly critical assets are required for treatment plant operations and have major consequences if they do not remain operational. The criticality of each asset was determined using a 1-5 rating system as outlined in Table 4.

Table 4. Criticality Assessment Rating System

1 - Non-Essential	Operation for the facility could continue indefinitely without this unit
2 - Essential	While the facility would be able to operate without this unit, the unit's non-operation would place stress on other treatment components (no loss in processing capacity)
3 - Highly Essential	While the facility would be able to operate without this unit, the unit's non-operation would place stress on other treatment components (loss in processing capacity)
4 - Critical	Failure of this unit would result in regulation non-compliance; wastewater can still be processed
5 - Highly Critical	Failure of this unit would result in regulation non-compliance; wastewater cannot be processed

The criticality rating is intended to be used along with the condition rating system developed in the asset inventory. The color coding indicates the importance of the condition; criticality with red is shown as the most important and green as the least. In the case that an orange condition rating (D-Poor) is paired with a red criticality (5-Highly Critical), the asset should be flagged for repairs or upgrades. The criticality rating can also be used in regular operations to help prioritize competing activities.

When assigning criticality ratings, redundancy is taken into account. When multiple units are available for operations, one unit may become non-functional and removed from service without affecting the plant operations. A lower criticality rating is given for units that have redundancy. When redundancy exists, it is still necessary for the unit to be repaired in a timely manner to reduce the risk of multiple units being out of service at the same time.

B. Wastewater Treatment Plant Criticality

Table 5 shows the criticality assessment for the assets at the WWTP. For full criticality comments, refer to the asset sheets contained in Appendix B.

Table 5. Surface Water Treatment Plant Criticality Assessment

ID	Asset Name	Condition Rating	Criticality Rating	Estimated Remaining Life
WW 1	**Headworks**	**B - Good**	**4 - Critical**	**15 years**
WW 1.1	Bar Screen Concrete Structure	B - Good	4 - Critical	Long Term Asset
WW 1.2	Bar Screen Hydraulic Gates	B - Good	4 - Critical	25 years
WW 1.3	Mechanical Bar Screen	B - Good	3 - Highly Essential	15 years
WW 1.4	Manual Bar Screen	B - Good	3 - Highly Essential	25 years
WW 1.5	Mechanical Bar Screen Electrical and Controls	B - Good	3 - Highly Essential	15 years
WW 2	**Aeration System**	**B - Good**	**4 - Critical**	**15 years**
WW 2.1	EDI Aeration/Mixing System	B - Good	4 - Critical	15 years
WW 2.1.1	Anchors and Ropes	B - Good	4 - Critical	8 years
WW 2.1.2	Air Laterals and Feeder Airline	B - Good	4 - Critical	15 years
WW 2.1.3	Air Diffuser	B - Good	4 - Critical	15 years
WW 2.2	Blowers	B - Good	3 - Highly Essential	15 years
WW 2.3	Blower Controls and Electrical	B - Good	4 - Critical	15 years
WW 2.4	DI Air Piping	B - Good	4 - Critical	40 years
WW 3	**Aerated Lagoon 1**	**C - Fair**	**3 - Highly Essential**	**5 years**
WW 3.1	Aerated Lagoon 1 (Basin)	C - Fair	3 - Highly Essential	5 years
WW 3.2	Aerator 1 Berm	C - Fair	**4 - Critical**	Long Term Asset
WW 3.3	Aerator 1 Hydraulic Structures	B - Good	3 - Highly Essential	Long Term Asset
WW 3.4	Aerator 1 Baffle	B - Good	3 - Highly Essential	15 years
WW 4	**Aerated Lagoon 2**	**C - Fair**	**3 - Highly Essential**	**5 years**
WW 4.1	Aerated Lagoon 2 (Basin)	C - Fair	3 - Highly Essential	5 years
WW 4.2	Aerator 2 Berm	B - Good	**4 - Critical**	Long Term Asset
WW 4.3	Aerator 2 Hydraulic Structures	B - Good	3 - Highly Essential	Long Term Asset

ID	Asset Name	Condition Rating	Criticality Rating	Estimated Remaining Life
WW 4.4	Aerator 2 Baffle	B - Good	3 - Highly Essential	15 years
WW 5	**Polishing Pond 1**	**C - Fair**	**3 - Highly Essential**	**10 years**
WW 5.1	Polishing Pond 1 (Basin)	C - Fair	3 - Highly Essential	10 years
WW 5.2	Polishing Pond 1 Berm	C - Fair	**4 - Critical**	Long Term Asset
WW 5.3	Polishing Pond 1 Hydraulic Structures	B - Good	3 - Highly Essential	Long Term Asset
WW 6	**Polishing Pond 2**	**C - Fair**	**3 - Highly Essential**	**10 years**
WW 6.1	Polishing Pond 2 (Basin)	C - Fair	3 - Highly Essential	10 years
WW 6.2	Polishing Pond 2 Berm	C - Fair	**4 - Critical**	Long Term Asset
WW 6.3	Polishing Pond 2 Hydraulic Structures	B - Good	3 - Highly Essential	Long Term Asset
WW 7	**Discharge Line and Structure**	**B - Good**	**4 - Critical**	**10 years**
WW 7.1	Discharge Pipe/Channel	B - Good	4 - Critical	Long Term Asset
WW 7.2	Parshall Flume	B - Good	4 - Critical	15 years
WW 8	**WWTP Site Infrastructure**	**B - Good**	**3 - Highly Essential**	**15 years**
WW 8.1	Office/Lab	B - Good	3 - Highly Essential	15 years
WW 8.2	Grinder Lift Station	B - Good	2 - Essential	15 years
WW 8.3	Gravel Drive	B - Good	3 - Highly Essential	15 years
WW 8.4	Barbed Wire Fencing	B - Good	4 - Critical	15 years
WW 8.5	Chain Link Fencing	B - Good	4 - Critical	15 years

After completing the criticality assessment, the following conclusions can be drawn:

1. The only asset that is assigned a lower criticality is the grinder lift station that serves the onsite office and lab.

2. All units at the WWTP are either highly essential or critical and therefore must remain in operation for proper treatment.

3. The aeration system is one of the most critical components at the plant. If the aeration system were to go down for an extended period of time, proper treatment would not occur.

4. All ponds are listed as 3-Highly Essential and need to remain operational for treatment. For short periods of time, a pond may be taken off-line for sludge removal. This has been done in the past.

SECTION IV
MINIMUM LIFE CYCLE COSTS

This section presents an overview of the existing minimum life cycle costs for the assets studied. The best practices for this section include: moving from reactive maintenance to predictive maintenance, knowing the costs and benefits of rehabilitation versus replacement, looking at lifecycle costs (especially for critical assets), deploying resources based on asset conditions, and analyzing the causes of asset failure to develop specific response plans.

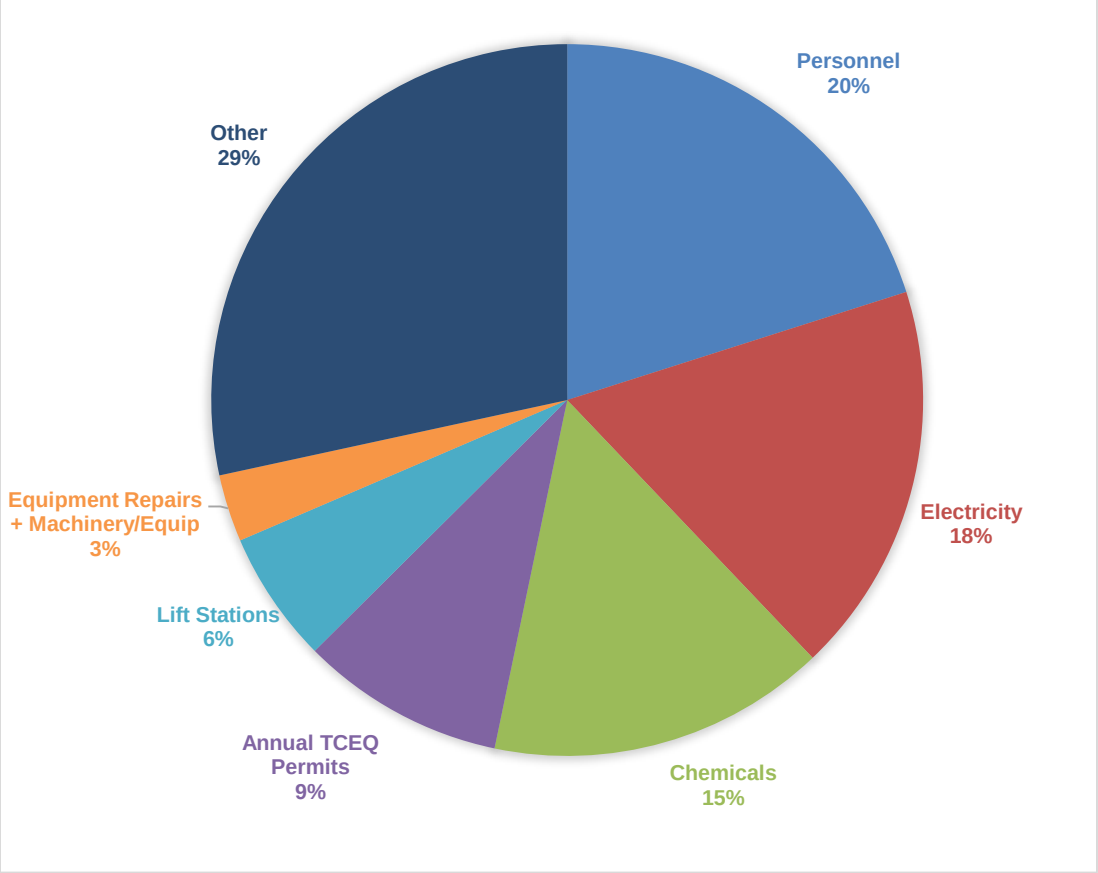
A. Current Treatment Plant Expenditures

In order to arrive at a minimum life cycle cost for the WWTP, the current expenditures were analyzed. From the accounting software, the city was able to provide a list of expenditures based on the budgeted items. This review studies the actual expenditures. On average, the city has been spending $459,000 per year on the wastewater treatment plant and sewer system expenditures. Table 6 and Figure 2 reveal the major expenditures at the WWTP and sewer system. Table 7 presents the detailed budgeted items.

Table 6. Sewer Expenditures Overview (2011-2014)

Budget Item	Average (2011-2014)	Percent Total
Personnel	$92,140	20.1%
Electricity	$81,661	17.8%
Chemicals	$70,569	15.4%
Annual TCEQ Permits	$42,552	9.3%
Lift Stations	$27,498	6.0%
Equipment Repairs + Machinery/Equip	$14,013	3.1%
Other	$130,258	28.4%
Total	*$458,690*	*100.0%*

Figure 2. Sewer Expenditures (2011-2014)



b

Table 7. Sewer Expenditures Overview

Budget Item	2011 Cost ($)	2012 Cost ($)	2013 Cost ($)	2014 Cost ($)	Average 2011-12 Cost ($)	Percent Total
Personnel	74,889	81,040	109,445	103,187	92,140	20.1%
Office Supplies/Postage	427	0	0	605	258	0.1%
Chemicals	66,590	60,941	63,790	90,953	70,569	15.4%
Gas & Oil	10,845	4,693	9,622	5,328	7,622	1.7%
General Supplies	7,862	2,687	1,779	1,407	3,434	0.7%
Uniforms	306	526	635	640	527	0.1%
Advertising	0	474	0	672	287	0.1%
Engineering	334	10,729	27,749	9,217	12,007	2.6%
Personal Training	922	1,287	1,224	761	1,049	0.2%
Telephone	1,686	2,054	1,505	1,135	1,595	0.3%
Electricity	116,095	90,478	64,380	55,692	81,661	17.8%
Vehicle Repair	3,510	1,448	539	904	1,600	0.3%
Building Repair	68	300	19	1,775	540	0.1%

Budget Item	2011 Cost ($)	2012 Cost ($)	2013 Cost ($)	2014 Cost ($)	Average 2011-12 Cost ($)	Percent Total
Equipment Repairs	9,627	6,009	12,472	17,537	11,411	2.5%
Sample Testing Fees	12,744	14,099	7,205	4,564	9,653	2.1%
Machinery/Equip	5,409	4,697	0	300	2,601	0.6%
Hobby Lift Station	889	13,238	75	424	3,656	0.8%
McDonald Lift Station	15,441	300	0	1,412	4,288	0.9%
City Park Lift Station	2,193	9,228	1,670	434	3,381	0.7%
TYC/Vernel Lift Station	27,110	18,456	2,511	3,452	12,882	2.8%
Rock Dam Lift Station	4,114	1,699	0	82	1,474	0.3%
Water Plant Lift Station	0	0	0	0	0	0.0%
Park St. Lift Station	0	0	5,447	0	1,816	0.4%
WWTP Lift Station	0	0	0	0	0	0.0%
Annual TCEQ Permits	33,415	42,999	50,509	43,284	42,552	9.3%
Total	*469,365*	*448,422*	*470,020*	*446,953*	*458,690*	*100.0%*

After reviewing the 2011-2014 expenditures, the following can be concluded:

1. Personnel, electricity, and chemicals are over half the annual sewer expenditures. Cost reduction through increased efficiencies in these areas has the greatest ability to reduce annual costs.

2. Equipment repairs at the wastewater treatment plant and lift stations are less than 10% of the total expenditures. There is a low cost allotted for equipment repairs.

3. Major capital expenses completed through TWDB loans are located in separate budget categories.

B. Minimum Life Cycle Costs Based on Asset Condition and Criticality

In reviewing the summary condition and criticality charts, the following recommendations should be used as a guide to arrive at a minimum life cycle cost:

1. A majority of the electrical power consumed at the plant is from the blowers. The blowers should be regularly checked to ensure they are running efficiently.

2. Since chemicals are a major expenditure, an audit of the chemicals used at the plant should be completed. This could involve consulting multiple chemical suppliers for recommendations on alternate chemicals.

3. The aeration lagoons should undergo sludge testing to determine the actual need for sludge removal. Accurate, timely records need to be kept on sludge levels in the lagoons. By regularly tracking the sludge levels in the aeration lagoon and polishing ponds, sludge removal may be proactively scheduled.

4. Some lagoon berms were marked as being in fair condition because of needed berm repairs. These repairs should be completed to restore the berm condition. The lagoon/pond berms must be maintained to prevent erosion from occurring. Identifying berm deficiencies is critical to realizing the full lagoon lifespan.

5. Long-term assets must be maintained to ensure their life spans do not prematurely decrease. The long-term assets at the plant include concrete structures, berms, hydraulic structures, and piping.

6. To meet TCEQ permit requirements, the city should pursue a project to implement disinfection at the WWTP.

7. Long-range financial planning should anticipate major expenditures at the plant such as the following:
    a. Implement disinfection at the WWTP in the near term
    b. Sludge removal at aeration basins in ~5 years
    c. Sludge removal at the polishing ponds in ~10 years
    d. Aeration system overhaul in ~15 years
    e. Bar screen replacement in ~15 years
    f. General site work upgrades in ~ 15 years

SECTION V
LONG TERM FUNDING PLANNING

This section presents an overview of the existing long-term funding planning. This report takes the approach that the city must ultimately develop the most appropriate funding strategy based on local considerations and constraints. Therefore, this section does not present a funding plan but instead provides commentary for the city to develop such a plan. The strategies the EPA has suggested to consider for this section are: revising the rate structure, funding a dedicated reserve from current revenues (i.e. creating an asset annuity), financing asset rehabilitation, repair, and replacement through borrowing or other financial assistance.

A. Strategies Available for Long-Term Funding

The previous four sections culminate with a long-term funding plan. This plan will need to address both efficiency recommendations to optimize operations and large capital expenses needed to complete upgrades. The previous section on minimum life cycle costs provides the optimal recommendations for lowering WWTP costs. In the case that upgrades are delayed or maintenance is deferred, the WWTP may be at additional risk for infrastructure failure.

The EPA identifies considerations that city should entertain when developing a long-term funding plan. These include revising the rate structure, funding a dedicated reserve fund, and pursing financial assistance. Each of these strategies are outlined below for consideration. Since the long-term funding plan must be developed by the city, these strategies are intended to be presented objectively and are for reference only.

Revise the Rate Structure

By revising the wastewater rate structure, the city may receive additional revenue to fund improvements. Revising the rate structure is most appropriate when items are underfunded. When completing any revisions to the rate structure, it is best to use a rate consultant to fully understand the potential revenue impact.

Funding a Dedicated Reserve Fund

A dedicated reserve fund can be used as an emergency fund in case a large, unforeseen capital expense occurs. In order to properly develop a dedicated reserve fund, the fund must be allowed to grow over a period of time. If budget items are underfunded, the reserve fund tends to be used as a regular funding source and reserve fund is not allowed to grow. Rules for a dedicated fund should be clearly established for the fund to properly grow.

Pursuing Financial Assistance or Other Financing

There are a variety of financial assistance programs available from governmental entities. Since the City of Marlin has median income lower than the state average, the city has qualified for grant funding in the past. Since financial assistance takes time to acquire, the planning process should begin as soon as possible to meet anticipated timelines. The associated grant rules and requirements must be considered when determining if the funding is appropriate. Financial assistance for the WWTP may available through the following sources:

- *Texas Department of Agriculture (TDA):* The TDA offers small grants through the TxCDBG program. This program will not allow for sludge removal projects.
- *Texas Water Development Board (TWDB):* The TWDB offers financial assistance in the form of loan forgiveness with the Clean Water State Revolving Fund. In the past, Marlin has received 30% loan forgiveness (grant) for disadvantaged community status and a 15% green grant for completing project elements that conform with the EPA green requirements.
- *US Department of Agriculture (USDA):* Through Rural Development, the USDA offers loans and grants for infrastructure improvements. The USDA funding timeline may be longer than other institutions.
- *Local Banks and Other Financial Institutions:* The city may consider taking out a loan from a local bank.
- *Other Grants and Assistance Programs:* Other grants may be available such as the grant that was used to fund this project. Engineers and grant consultants often track available funding sources. Also, involvement through local government may reveal other potential funding sources.

B. Recommendations to Maintain Asset Management Plan

This asset management plan is intended to be a living document that is updated on at least an annual basis. By maintaining the asset management plan, the city may continue to consult condition, criticality, and remaining life when prioritizing projects.

Appendix A:
Asset Management: A Best Practices Guide by EPA

EPA
United States
Environmental Protection
Agency

Asset Management: A Best Practices Guide

Introduction

Purpose	This guide will help you understand: • What asset management means. • The benefits of asset management. • Best practices in asset management. • How to implement an asset management program.
Target Audience	This guide is intended for owners, managers, and operators of water systems, local officials, technical assistance providers, and state personnel.

Asset Management

Asset management is maintaining a desired level of service for what you want your assets to provide at the lowest life cycle cost. Lowest life cycle cost refers to the best appropriate cost for rehabilitating, repairing or replacing an asset. Asset management is implemented through an **asset management program** and typically includes a written **asset management plan**.

Challenges faced by Water Systems

- Determining the best (or optimal) time to rehabilitate/repair/replace aging assets.
- Increasing demand for services.
- Overcoming resistance to rate increases.
- Diminishing resources.
- Rising service expectations of customers.
- Increasingly stringent regulatory requirements.
- Responding to emergencies as a result of asset failures.
- Protecting assets.

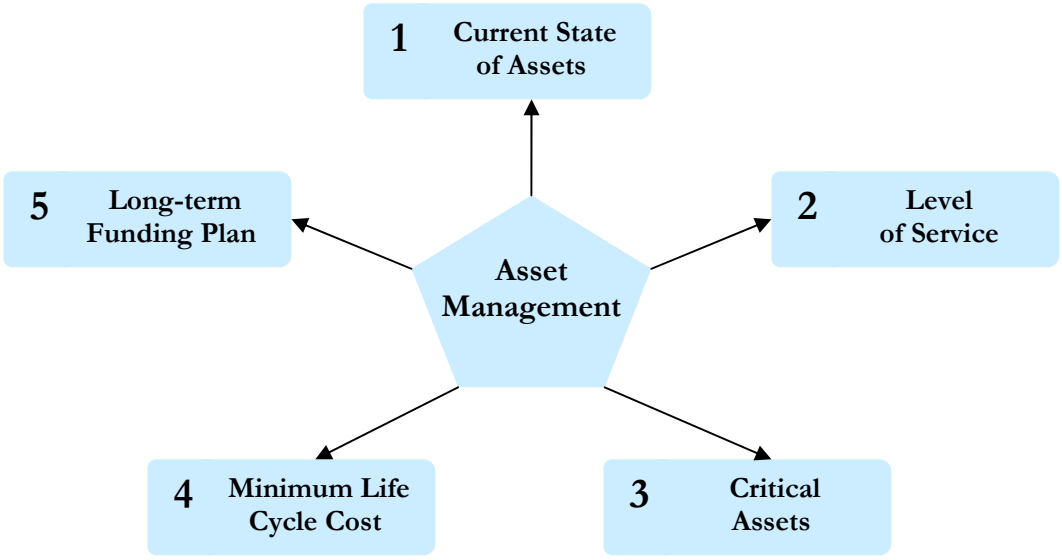
Benefits of Asset Management

- Prolonging asset life and aiding in rehabilitate/repair/replacement decisions through efficient and focused operations and maintenance.
- Meeting consumer demands with a focus on system sustainability.
- Setting rates based on sound operational and financial planning.
- Budgeting focused on activities critical to sustained performance.
- Meeting service expectations and regulatory requirements.
- Improving response to emergencies.
- Improving security and safety of assets.

Implementing Asset Management: Five Core Questions Framework

A good starting point for any size water system is the five core questions framework for asset management. This framework walks you through all of the major activities associated with asset management and can be implemented at the level of sophistication reasonable for a given system. These five core framework questions provide the foundation for many asset management best practices. Several asset management best practices are listed for each core question on the following pages. Keep in mind that these best practices are constantly being improved upon.

Flow Chart: The Five Core Questions of Asset Management Framework



This flow chart shows the relationships and dependencies between each core framework question.

1. What is the current state of my system's assets?

The first step in managing your assets is knowing their current state. Because some of this information may be difficult to find, you should use estimates when necessary. Over time, as assets are rehabilitated, repaired or replaced, your inventory will become more accurate.

You should ask:

- What do I own?
- Where is it?
- What is its condition?
- What is its useful life?
- What is its value?

Best practices include:

- Preparing an asset inventory and system map.
- Developing a condition assessment and rating system.
- Assessing remaining useful life by consulting projected-useful-life tables or decay curves.
- Determining asset values and replacement costs.

2. What is my required "sustainable" level of service?

Knowing your required "sustainable" level of service will help you implement an asset management program and communicate to stakeholders what you are doing. Quality, quantity, reliability, and environmental standards are elements that can define level of service and associated system performance goals, both short- and long-term. You can use information about customer demand, data from utility commissions or boards, and information from other stakeholders to develop your level of service requirements. Your level of service requirements can be updated to account for changes due to growth, regulatory requirements, and technology improvements.

You should ask:

- What level of service do my stakeholders and customers demand?
- What do the regulators require?
- What is my actual performance?
- What are the physical capabilities of my assets?

Best practices include:

- Analyzing current and anticipated customer demand and satisfaction with the system.
- Understanding current and anticipated regulatory requirements.
- Writing and communicating to the public a level of service "agreement" that describes your system's performance targets.
- Using level of service standards to track system performance over time.

3. Which assets are critical to sustained performance?

Because assets fail, how you manage the consequences of failure is vital. Not every asset presents the same failure risk, or is equally critical to your water system's operations. Therefore, it is important to know which assets are required to sustain your water system's performance. Critical assets are those you decide have a high risk of failing (old, poor condition, etc.) and major consequences if they do fail (major expense, system failure, safety concerns, etc.). You can decide how critical each asset is and rank them accordingly. Many water systems may have already accomplished this type of analysis in vulnerability assessments.

You should ask:

- How can assets fail?
- How do assets fail?
- What are the likelihoods (probabilities) and consequences of asset failure?
- What does it cost to repair the asset?
- What are the other costs (social, environmental, etc.) that are associated with asset failure?

Best practices include:

- Listing assets according to how critical they are to system operations.
- Conducting a failure analysis (root cause analysis, failure mode analysis).
- Determining the probability of failure and listing assets by failure type.
- Analyzing failure risk and consequences.
- Using asset decay curves.
- Reviewing and updating your system's vulnerability assessment (if your system has one).

4. What are my minimum life cycle costs?

Operations and maintenance (O&M), personnel, and the capital budget account for an estimated 85 percent of a typical water system's expenses. Asset management enables a system to determine the lowest cost options for providing the highest level of service over time. You want to optimize the work O&M crews are doing, where they are doing it, and why. An asset management program helps make risk-based decisions by choosing the right project, at the right time, for the right reason.

You should ask:

- What alternative strategies exist for managing O&M, personnel, and capital budget accounts?
- What strategies are the most feasible for my organization?
- What are the costs of rehabilitation, repair, and replacement for critical assets?

Best practices include:

- Moving from reactive maintenance to predictive maintenance.
- Knowing the costs and benefits of rehabilitation versus replacement.
- Looking at lifecycle costs, especially for critical assets.
- Deploying resources based on asset conditions.
- Analyzing the causes of asset failure to develop specific response plans.

5. What is my best long-term funding strategy?

Sound financial decisions and developing an effective long-term funding strategy are critical to the implementation of an asset management program. Knowing the full economic costs and revenues generated by your water system will enable you to determine your system's financial forecast. Your system's financial forecast can then help you decide what changes need to be made to your system's long-term funding strategy.

You should ask:

- Do we have enough funding to maintain our assets for our required level of service?
- Is our rate structure sustainable for our system's long-term needs?

Some strategies to consider:

- Revising the rate structure.
- Funding a dedicated reserve from current revenues (i.e., creating an asset annuity).
- Financing asset rehabilitation, repair, and replacement through borrowing or other financial assistance.

Implementing Asset Management: Follow-up and Continuing Steps

The five core questions framework for asset management is the starting point for asset management. Beyond planning, asset management should be implemented to achieve continual improvements through a series of "plan, do, check, act" steps.

- Plan: Five core questions framework (short-term), revise asset management plan (long-term).
- Do: Implement asset management program.
- Check: Evaluate progress, changing factors and new best practices.
- Act: Take action based on review results.

For additional information: Call the Safe Drinking Water Hotline at 1-800-426-4791, visit the EPA Web site at http://www.epa.gov/safewater/smallsystems or contact your state drinking water representative.

Appendix B:
Asset Management Summary Sheets

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Headworks**
Asset ID:	**WW 1**
Year Constructed:	1995
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	The headworks structure contains a mechanical and manual bar screens along with associated gates and channels.
Level of Service:	Keep headworks operational 100% of the time with the mechanical bar screen used as the primary screening unit.
Condition Comments:	The Headworks is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The headworks are needed to remove all trash from and prevent it from entering into the lagoons and ponds.
Asset Value and Replacement Cost:	$282,500
Recommendations for Unit:	Continue to maintain headworks unit.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Bar Screen Concrete Structure**
Asset ID:	**WW 1.1**
Year Constructed:	1995
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	Long Term Asset
Description:	The bar screens are houses in a concrete structure that is located at a higher elevation than the aerated lagoons. The concrete has two parallel channels and an outlet structure that discharges to aerated lagoon 1.
Condition Comments:	The Bar Screen Concrete Structure is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The bar screen/ headworks structure is necessary for containing and directing the incoming wastewater flow.
Asset Value and Replacement Cost:	Long Term Asset
Recommendations for Unit:	Continue to ensure that concrete is in good structural condition with no missing concrete or exposed rebar.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Bar Screen Hydraulic Gates**
Asset ID:	**WW 1.2**
Year Constructed:	1995
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	25 years
Description:	The concrete channels house two wheel operated gates that allow for elevation adjustment. The gate elevations allow the operators to select what channel will primarily receive the raw wastewater,
Condition Comments:	The Bar Screen Hydraulic Gates are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The bar screen gates are necessary for controlling the flow into the bar screen channels. Without the gates, the operators have no control over the incoming flow.
Asset Value and Replacement Cost:	$50,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Mechanical Bar Screen**
Asset ID:	**WW 1.3**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	A 2.0 MGD capacity spiral screen bar screen manufactured by Westech is located at the headworks.
Condition Comments:	The Mechanical Bar Screen is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The mechanical bar screen is the primary screening unit but can be taken out of service for short amounts of time for repair and maintenance. This unit is redundant with the manual bar screen.
Asset Value and Replacement Cost:	$200,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Manual Bar Screen**
Asset ID:	**WW 1.4**
Year Constructed:	1995
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	25 years
Description:	A manual bar screen is located in the opposite channel from the mechanical bar screen.
Condition Comments:	The Manual Bar Screen is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The manual bar screen handles the overflow into the plant and is also used when the manual bar screen is taken out of service. This unit is redundant with the mechanical bar screen.
Asset Value and Replacement Cost:	$7,500
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Mechanical Bar Screen Electrical and Controls**
Asset ID:	**WW 1.5**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	A NEMA 4X enclosure is provided to automatically control the bar screen. A local control panel is at the bar screen site.
Condition Comments:	The Mechanical Bar Screen Electrical and Controls are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The electrical controls are needed to run the mechanical bar screen. This mechanical bar screen can be taken out of service temporarily while the manual bar screen is used.
Asset Value and Replacement Cost:	$25,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aeration System**
Asset ID:	**WW 2**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	**4 - Critical**
Estimated Remaining Life:	15 years
Description:	An aeration/ mixing system manufactured by EDI aerates two primary treatment lagoons through air laterals, diffusers, and blowers.
Level of Service:	Maintain aeration system operational at all times.
Condition Comments:	The Aeration System is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The aeration system is necessary for proper wastewater treatment. Without aeration, proper treatment is not possible.
Asset Value and Replacement Cost:	$800,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**EDI Aeration/Mixing System**
Asset ID:	**WW 2.1**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	The EDI Aeration/Mixing system directly aerates the lagoon through diffusers located in the lagoon. A set of air laterals and feeder lines distribute the air to the diffusers.
Condition Comments:	The EDI Aeration/Mixing System is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The aeration system is necessary for proper wastewater treatment. Without aeration, proper treatment is not possible.
Asset Value and Replacement Cost:	$500,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Anchors and Ropes**
Asset ID:	**WW 2.1.1**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	8 years
Description:	The air laterals are have a support structure that is comprised of ropes tied off at anchor points.
Condition Comments:	The Anchors and Ropes are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The anchors and ropes are needed to keep the diffusers located in their correct depth and location.
Asset Value and Replacement Cost:	$50,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Air Laterals and Feeder Airline**
Asset ID:	**WW 2.1.2**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	Air is distributed through a system of HDPE air laterals and EPDM feeder airlines.
Condition Comments:	The Air Laterals and Feeder Airline is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The airlines are needed to properly distribute air to the lagoon and must be maintained without leaks.
Asset Value and Replacement Cost:	$300,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Air Diffuser**
Asset ID:	**WW 2.1.3**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	Air diffusers are located near the bottom of the lagoon and are used to blow air into the lagoon.
Condition Comments:	The Air Diffuser is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The air diffusers are necessary to transfer air from the blower to the wastewater.
Asset Value and Replacement Cost:	$150,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Blowers**
Asset ID:	**WW 2.2**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	Two blowers are used to distribute the air to the aeration system. These blowers are located near the two aerated lagoons.
Condition Comments:	The Blowers are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	One blower is needed to distribute air into the lagoons. Since two blowers are provided, there is redundancy. One blower may be temporarily taken out of service.
Asset Value and Replacement Cost:	$150,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Blower Controls and Electrical**
Asset ID:	**WW 2.3**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	A local control panel automatically controls the two blowers.
Condition Comments:	The Blower Controls and Electrical are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The blower controls and electrical system is necessary to keep the blowers operational and inject air into the aerated lagoons.
Asset Value and Replacement Cost:	$50,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**DI Air Piping**
Asset ID:	**WW 2.4**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	40 years
Description:	Above ground ductile iron air piping is used to distribute the air to the EDI Aeration/Mixing System
Condition Comments:	The DI Air Piping is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The DI pipes is necessary to transfer the air from the blowers to the diffusers and must remain operational for proper treatment.
Asset Value and Replacement Cost:	$100,000
Recommendations for Unit:	Continue to ensure pipes are in good working order. Touch up coating system as needed.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerated Lagoon 1**
Asset ID:	**WW 3**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	5 years
Description:	Aerated Lagoon 1 aerates the raw wastewater from the headworks.
Level of Service:	Keep Aerated lagoon 1 operational at all times.
Condition Comments:	According to conversations with the treatment plant operators, Aerated Lagoon 1 has a high MLSS loading and possible sludge accumulation. Sludge removal may be necessary in the next 5 years. The lagoon also needs to have vegetation removed from the air laterals.
Criticality Comments:	This aerated lagoon is needed for proper wastewater treatment. This lagoon has redundancy with aerated lagoon 2 and may be temporarily taken out of service under emergency conditions or for infrastructure upgrades.
Asset Value and Replacement Cost:	$200,000
Recommendations for Unit:	Measure the sludge accumulation in the aerators. Complete sludge removal as indicated by tests.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerated Lagoon 1 (Basin)**
Asset ID:	**WW 3.1**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	5 years
Description:	Aerated Lagoon 1 aerates the raw wastewater from the headworks.
Condition Comments:	According to conversations with the treatment plant operators, Aerated Lagoon 1 has a high MLSS loading and possible sludge accumulation. Sludge removal may be necessary in the next 5 years. The lagoon also needs to have vegetation removed from the air laterals.
Criticality Comments:	This aerated lagoon is needed fpr proper wastewater treatment. This lagoon has redundancy with aerated Lagoon 2 and may be temporarily taken out of service.
Asset Value and Replacement Cost:	$150,000
Recommendations for Unit:	Measure the sludge accumulation in the aerators. Complete sludge removal as indicated by tests.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerator 1 Berm**
Asset ID:	**WW 3.2**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	4 - Critical
Estimated Remaining Life:	Long Term Asset
Description:	The berms are used to create the lagoon basin and are earthen with grass vegetation to prevent erosion.
Condition Comments:	The lagoon berm has one location where slumping is apparent. At this location, the lagoon berm should be repaired.
Criticality Comments:	The berm is essential for containing the basin and preventing unathorized discharges.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Maintain berm to prevent erosion.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerator 1 Hydraulic Structures**
Asset ID:	**WW 3.3**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	Long Term Asset
Description:	An outlet structure transfers the wastewater from Aerated Lagoon 1 to 2.
Condition Comments:	The Aerator 1 Hydraulic Structures are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The hydraulic structures are necessary for controlling flow from one unit to another.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Ensure hydraulic structure is in good working order.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerator 1 Baffle**
Asset ID:	**WW 3.4**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	A baffle is installed to prevent short circuiting.
Condition Comments:	The Aerator 1 Baffle is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The baffle is needed to prevent short circuiting and may be removed temporarily.
Asset Value and Replacement Cost:	$50,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerated Lagoon 2**
Asset ID:	**WW 4**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	5 years
Description:	Aerated Lagoon 2 aerates the raw wastewater from the headworks.
Level of Service:	Keep Aerated Lagoon 2 operational at all times.
Condition Comments:	According to conversations with the treatment plant operators, Aerated Lagoon 2 has a high MLSS loading and possible sludge accumulation. Sludge removal may be necessary in the next 5 years. The lagoon also needs to have vegetation removed from the air laterals.
Criticality Comments:	This aerated lagoon is needed for proper wastewater treatment. This lagoon has redundancy with aerated lagoon 1 and may be temporarily taken out of service under emergency conditions or for infrastructure upgrades.
Asset Value and Replacement Cost:	$200,000
Recommendations for Unit:	Measure the sludge accumulation in the aerators. Complete sludge removal as indicated by tests.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerated Lagoon 2 (Basin)**
Asset ID:	**WW 4.1**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	5 years
Description:	Aerated Lagoon 2 aerates the raw wastewater from the headworks.
Condition Comments:	According to conversations with the treatment plant operators, Aerated Lagoon 2 has a high MLSS loading and possible sludge accumulation. Sludge removal may be necessary in the next 5 years. The lagoon also needs to have vegetation removed from the air laterals.
Criticality Comments:	This aerated lagoon is needed fpr proper wastewater treatment. This lagoon has redundancy with aerated Lagoon 1 and may be temporarily taken out of service.
Asset Value and Replacement Cost:	$150,000
Recommendations for Unit:	Measure the sludge accumulation in the aerators. Complete sludge removal as indicated by tests.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerator 2 Berm**
Asset ID:	**WW 4.2**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	Long Term Asset
Description:	The berms are used to create the lagoon basin and are earthen with grass vegetation to prevent erosion.
Condition Comments:	The Aerator 2 Berm is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The berm is essential for containing the basin and preventing unathorized discharges.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Maintain berm to prevent erosion.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerator 2 Hydraulic Structures**
Asset ID:	**WW 4.3**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	Long Term Asset
Description:	An outlet structure transfers the wastewater from Aerated Lagoon 2 to Polishing Pond 1.
Condition Comments:	The Aerator 2 Hydraulic Structures are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The hydraulic structures are necessary for controlling flow from one unit to another.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Ensure hydraulic structure is in good working order.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Aerator 2 Baffle**
Asset ID:	**WW 4.4**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	A baffle is installed to prevent short circuiting.
Condition Comments:	The Aerator 2 Baffle is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The baffle is needed to prevent short circuiting and may be removed temporarily.
Asset Value and Replacement Cost:	$50,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 1**
Asset ID:	**WW 5**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	10 years
Description:	Polishing Pond 1 is used for polishing the aerated wastewater.
Level of Service:	Keep Polishing Pond 1 operational at all times.
Condition Comments:	Polishing Pond 1 is in FAIR condition due to the sludge accumulation that has occurred since 2009 when sludge was last removed. The berm has select locations that are in need of repair.
Criticality Comments:	The polishing pond is needed proper wastewater treatment. This pond has redundancy with Polishing Pond 2 and may be temporarily taken out of service.
Asset Value and Replacement Cost:	$300,000
Recommendations for Unit:	Complete sludge level measurements to determine amount of accumulated sludge. Remove sludge when needed.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 1 (Basin)**
Asset ID:	**WW 5.1**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	10 years
Description:	Polishing Pond 1 is used for polishing the aerated wastewater.
Condition Comments:	Polishing Pond 1 is in FAIR condition due to the sludge accumulation that has occurred since 2009 when it was last removed.
Criticality Comments:	This polishing pond is needed for proper wastewater treatment. This pond has redundancy with aerated Polishing Pond 2 and may be temporarily taken out of service.
Asset Value and Replacement Cost:	$300,000
Recommendations for Unit:	Complete sludge level measurements to determine amount of accumulated sludge. Removal sludge when needed.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 1 Berm**
Asset ID:	**WW 5.2**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	4 - Critical
Estimated Remaining Life:	Long Term Asset
Description:	The berms are used to create the lagoon basin and are earthen with grass vegetation to prevent erosion. Rip rap was installed in select location as a part of the 2009 project.
Condition Comments:	The berm is in FAIR condition because, select locations along the berm are in need of minor repairs due to erosion and deterioration. These locations should be repaired as a part of a regular maintenance program.
Criticality Comments:	The berm is essential for containing the basin and preventing unathorized discharges.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Maintain berm to prevent erosion.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 1 Hydraulic Structures**
Asset ID:	**WW 5.3**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	Long Term Asset
Description:	An outlet structure transfers the wastewater from Polishing Pond 1 to 2
Condition Comments:	The Polishing Pond 1 Hydraulic Structures are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The hydraulic structures are necessary for controlling flow from one unit to another.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Ensure hydraulic structure is in good working order.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 2**
Asset ID:	**WW 6**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	10 years
Description:	Polishing Pond 2 is used for polishing the aerated wastewater.
Level of Service:	Keep Polishing Pond 2 operational at all times.
Condition Comments:	Polishing Pond 2 is in FAIR condition due to the sludge accumulation that has occurred since 2009 when sludge was last removed. The berm has select locations that are in need of repair.
Criticality Comments:	The polishing pond is needed proper wastewater treatment. This pond has redundancy with Polishing Pond 1 and may be temporarily taken out of service.
Asset Value and Replacement Cost:	$300,000
Recommendations for Unit:	Complete sludge level measurements to determine amount of accumulated sludge. Remove sludge when needed.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 2 (Basin)**
Asset ID:	**WW 6.1**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	10 years
Description:	Polishing Pond 2 is used for polishing the aerated wastewater.
Condition Comments:	Polishing Pond 2 is in FAIR condition due to the sludge accumulation that has occurred since 2009 when it was last removed.
Criticality Comments:	This polishing pond is needed for proper wastewater treatment. This pond has redundancy with aerated Polishing Pond 1 and may be temporarily taken out of service.
Asset Value and Replacement Cost:	$300,000
Recommendations for Unit:	Complete sludge level measurements to determine amount of accumulated sludge. Removal sludge when needed.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 2 Berm**
Asset ID:	**WW 6.2**
Year Constructed:	~1980
Condition Rating:	C - Fair
Criticality Rating:	**4 - Critical**
Estimated Remaining Life:	Long Term Asset
Description:	The berms are used to create the lagoon basin and are earthen with grass vegetation to prevent erosion. Rip rap was installed in select location as a part of the 2009 project.
Condition Comments:	The berm is in FAIR condition because, select locations along the berm are in need of minor repairs due to erosion and deterioration. These locations should be repaired as a part of a regular maintenance program.
Criticality Comments:	The berm is essential for containing the basin and preventing unathorized discharges.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Maintain berm to prevent erosion.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Polishing Pond 2 Hydraulic Structures**
Asset ID:	**WW 6.3**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	Long Term Asset
Description:	An outlet structure transfers the wastewater from Polishing Pond 2 to the treatment plant outlet.
Condition Comments:	The Polishing Pond 2 Hydraulic Structures are in GOOD condition and only exhibit minor deterioration.
Criticality Comments:	The hydraulic structures are necessary for controlling flow from one unit to another.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Ensure hydraulic structure is in good working order.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Discharge Line and Structure**
Asset ID:	**WW 7**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	10 years
Description:	The discharge line and structure is used to flow water from the final point to the outfall where it is measured.
Level of Service:	Maintain discharge line operational at all times.
Condition Comments:	The Discharge Line and Structure is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The discharge line is required to transport wastewater to the treatment plant discharge point.
Asset Value and Replacement Cost:	$30,000
Recommendations for Unit:	Continue to maintain.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Discharge Pipe/Channel**
Asset ID:	**WW 7.1**
Year Constructed:	1992
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	Long Term Asset
Description:	The discharge pipe was installed in 1992.
Condition Comments:	The Discharge Pipe/Channel is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The discharge line provides the only means to transfer water from the final polishing pond to the outlet.
Asset Value and Replacement Cost:	N/A
Recommendations for Unit:	Continue to ensure that concrete is in good structural condition with no missing concrete or exposed rebar.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Parshall Flume**
Asset ID:	**WW 7.2**
Year Constructed:	1965
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	A Parshall flume is used to measure the flow out of the plant.
Condition Comments:	The Parshall Flume is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	This flow measuring device is required by TCEQ and is needed to measure pant flows.
Asset Value and Replacement Cost:	$30,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**WWTP Site Infrastructure**
Asset ID:	**WW 8**
Year Constructed:	1965-2009
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	The WWTP includes support infrastructure that includes a office/lab, grinder lift station, gravel drive, and fencing.
Level of Service:	Maintain support infrastructure to allow for efficient wastewater treatment operations.
Condition Comments:	The WWTP Site Infrastructure is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	Supporting infrastructure is needed to keep the treatment units operational.
Asset Value and Replacement Cost:	$230,000
Recommendations for Unit:	Continue to maintain.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Office/Lab**
Asset ID:	**WW 8.1**
Year Constructed:	1965
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	The office was constructed with the original plant and is used as a lab and office.
Condition Comments:	The Office/Lab is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The office and lab is needed to store records and complete testing.
Asset Value and Replacement Cost:	$50,000
Recommendations for Unit:	Continue to maintain.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Grinder Lift Station**
Asset ID:	**WW 8.2**
Year Constructed:	2009
Condition Rating:	B - Good
Criticality Rating:	2 - Essential
Estimated Remaining Life:	15 years
Description:	A grinder lift station is used to pump wastewater from the building to the plant headworks.
Condition Comments:	The Grinder Lift Station is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The grinder lift station only services the office/lab. If the grinder lift station goes out of service, then the office bathroom and sinks cannot be used.
Asset Value and Replacement Cost:	$50,000
Recommendations for Unit:	Continue to maintain equipment.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Gravel Drive**
Asset ID:	**WW 8.3**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	3 - Highly Essential
Estimated Remaining Life:	15 years
Description:	Gravel drives are located throughout the plant.
Condition Comments:	The Gravel Drive is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	Gravel drives provide needed access to treatment units.
Asset Value and Replacement Cost:	$40,000
Recommendations for Unit:	Continue to maintain.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Barbed Wire Fencing**
Asset ID:	**WW 8.4**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	A barb wire fence surrounds the entire wastewater treatment plant.
Condition Comments:	The Barbed Wire Fencing is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The barb wire fencing provides security per TCEQ requirements.
Asset Value and Replacement Cost:	$60,000
Recommendations for Unit:	Continue to maintain.

City of Marlin, Texas
Wastewater Treatment Plant
Asset Management Plan (2015)

Asset Name:	**Chain Link Fencing**
Asset ID:	**WW 8.5**
Year Constructed:	~1980
Condition Rating:	B - Good
Criticality Rating:	4 - Critical
Estimated Remaining Life:	15 years
Description:	Chain link fencing surrounds the aerated lagoons and headworks.
Condition Comments:	The Chain Link Fencing is in GOOD condition and only exhibits minor deterioration.
Criticality Comments:	The chain link fencing provides security per TCEQ requirements.
Asset Value and Replacement Cost:	$30,000
Recommendations for Unit:	Continue to maintain.