Lift Station Condition Assessment Report and Improvement Plan

CONSENT DECREE
DOJ No. 90-5-1-1-09767

The United States Environmental Protection Agency
And
Texas Commission on Environmental Quality

Tyler Water Utilities

October 2018

PIPELINE ANALYSIS LLC
WASTEWATER COLLECTION SYSTEM ENGINEERS

CITY OF TYLER
CONSENT DECREE, DOJ No. 90-5-1-1-09767

Lift Station Condition Assessment and Improvement Plan
October 2018

Enclosed is the City of Tyler Lift Station Condition Assessment and Improvement Plan. The report structure follows the requirements listed in Section V. COMPLIANCE REQUIREMENTS, Sub-part E. Lift Station Condition/Capacity Evaluation and Improvement Program of *United States et. al v. City of Tyler* Consent Decree.

CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering such information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including possibility of fine and imprisonment for knowing violations.

_____

Scott Taylor, P.E. Date
Managing Director of Utilities and Public Works

CITY OF TYLER

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STATE OF TEXAS
J. H. FORBES, JR.
43529
LICENSED
PROFESSIONAL ENGINEER

October 2018

STATE OF TEXAS
WILLIAM LOGAN BURTON
99383
LICENSED
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9-24-18

I CERTIFY THAT THIS REPORT WAS PREPARED UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF TEXAS. THIS DOCUMENT IS RELEASED UNDER THE AUTHORITY OF:
JAMES H. FORBES, JR., P.E. LIC. NO. 43529
DATE: SEPTEMBER 24, 2018

W. Logan Burton 9/24/18

I CERTIFY THAT THIS REPORT WAS PREPARED UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF TEXAS. THIS DOCUMENT IS RELEASED UNDER THE AUTHORITY OF:
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1. Executive Summary

The City of Tyler, Texas has two (2) wastewater treatment plants (WWTPs) - The South WWTP and the West WWTP. In order to provide necessary hydraulic head for conveying wastewater to these plants, lift stations are constructed at strategic locations in the wastewater collection system. The City of Tyler owns and operates a total of 24 lift stations. Of these, 15 lift stations are located in the West WWTP basin and nine (9) lift stations are located in the South WWTP basin. The purpose of this report was to perform a condition assessment of all 24 lift stations in Tyler and provide a Lift Station Improvement Plan that would recommend improvements at each lift station.

In order to determine the condition of each lift station, major components were visually assessed and pump drawdown tests were conducted to determine the performance of the lift station pumps. The lift station components in need of improvement were identified and prioritized based on the following:

- *CONDITION*: The condition of each component was identified based on visual assessment and operational input from the Tyler Water Utilities (TWU) staff.

- *CRITICALITY*: The criticality of each component considers the relative risk arising from the failure of the component and its consequent effect on the functioning of the lift station. This was assigned for each major component of the lift station.

- *PRIORITY*: The different components were prioritized based on their criticality and condition. **Table 1-1** below shows the priority assignment criteria used for each lift station component.

Table 1-1: Priority Assignment Criteria

CRITICALITY	CONDITION		
	Good	Fair	Poor
Low	Low Priority	Low Priority	Low Priority
Medium	Low Priority	Medium Priority	High Priority
High	Low Priority	Medium Priority	High Priority

Based on the priority assigned to different lift station components, a Lift Station Improvement Plan was developed to address the needs of each lift station.

A summary of the Lift Station Improvement Plan is provided in **Table 1-2**. The table lists all recommended improvements and associated costs along with an anticipated project schedule. The preliminary opinion of probable project cost for the implementation of the Lift Station Improvement Plan is estimated to be $1,243,680.

Note that this Lift Station Improvement Plan may be modified, if necessary, based on results of the Hydraulic Model Capacity Assessment under development by TWU.

Table 1-2: Lift Station Improvement Plan Summary

RECOMMENDED IMPROVEMENTS TO ANIMAL SHELTER LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Install Electric Breaker for Pump 1	1	LS	$ 300.00	$ 300.00	Poor	High	HIGH
2	Install Cam Lock Quick Connect to Force Main for Portable Pump. (Cost includes valves, fittings, etc. required for connection)	1	LS	$ 5,000.00	$ 5,000.00	Poor	Medium	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	-	-			N/A	High	HIGH
4	Install Flood Light on Site	1	EA	$15,000.00	$ 15,000.00	N/A	Low	LOW
				Contingency (20%)	$ 4,060.00			
				Total Construction cost	$ 24,360.00			

RECOMMENDED IMPROVEMENTS TO BELLWOOD LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Install Stainless Steel I/I Inhibitor at Wet Well Access Manhole	1	LS	$ 250.00	$ 250.00	N/A	High	HIGH
2	Replace Manhole Lid on Gravity Influent	1	LS	$ 2,500.00	$ 2,500.00	N/A	High	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	Poor	High	HIGH
4	Line wet well for corrosion protectior	363	SF	$ 75.00	$ 28,000.00	Poor	Medium	HIGH
6	Install NEMA4X Electrical Panels	1	LS	$50,000.00	$ 50,000.00	Fair	Medium	MEDIUM
7	Replace on Site Lighting	1	LS	$15,000.00	$ 15,000.00	Poor	Low	LOW
8	Replace Latch on Dog House Door	1	LS	$ 100.00	$ 100.00	Fair	Low	LOW
				Contingency (20%)	$ 19,170.00			
				Total Construction cost	$ 115,020.00			

RECOMMENDED IMPROVEMENTS TO CR 46 NEW HARMONY LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	-	-	Poor	High	HIGH
2	Inspect For Functionality and Replace 12" DI Surge Valve.	1	EA	$18,000.00	$ 18,000.00	Fair	Medium	MEDIUM
				Contingency (20%)	$ 3,600.00			
				Total Construction cost	$ 21,600.00			

RECOMMENDED IMPROVEMENTS TO DIXIE LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	Poor	Medium	HIGH
2	Replace Dog House Cover	1	LS	$10,000.00	$ 10,000.00	Critical	High	HIGH
3	Replace Electrical Panel Enclosure	1	LS	$15,000.00	$ 15,000.00	Poor	High	HIGH
4	Coat Wet Well To Avoid Further Concrete Deterioration	260	SF	$ 45.00	$ 12,000.00	Poor	Medium	HIGH
5	Install Stainless Steel I/I Inhibitor at Wet Well	1	EA	$ 250.00	$ 250.00	N/A	Medium	MEDIUM
6	Install Exterior and Interior Light	1	LS	$10,000.00	$ 10,000.00	Poor	Low	LOW
				Contingency (20%)	$ 9,450.00			
				Total Construction Cost	$ 56,700.00			

RECOMMENDED IMPROVEMENTS TO GREENBRIAR LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	Poor	High	HIGH
2	Repair 2" PVC Water Line Inside Building	1	LS	$ 500.00	$ 500.00	Poor	High	HIGH
3	Remove and Replace Damaged 2 ft by 2 ft DI Slab Cover for Future Pump With FRP Cover	1	LS	$ 1,000.00	$ 1,000.00	Poor	Medium	HIGH
				Contingency (20%)	$ 300.00			
				Total Construction Cost	$ 1,800.00			

Table 1-2: Lift Station Improvement Plan Summary

RECOMMENDED IMPROVEMENTS TO HAVERHILL LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
2	Replace 6-inch D.I. Check Valve	1	LS	$ 5,000.00	$ 5,000.00	Poor	High	HIGH
3	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	N/A	High	HIGH
4	Replace Wet Well Access Manhole Lid	1	LS	$ 1,000.00	$ 1,000.00	Poor	Medium	HIGH
5	Site Grading Around Dog House To Ensure Positive Drainage	1	LS	$ 5,000.00	$ 5,000.00	N/A	Medium	MEDIUM
6	Replace Riser Piping and Fittings in Wet Well	1	LS	$ 5,000.00	$ 5,000.00	Poor	Low	MEDIUM
7	Install Stainless Steel Inflow Inhibitor at Wet Well Access Manhole	1	LS	$ 250.00	$ 250.00	N/A	Medium	MEDIUM
8	Install Strobe and Horn Alarm System	1	LS	$ 5,000.00	$ 5,000.00	N/A	Medium	MEDIUM
				Contingency (20%)	$ 5,250.00			
				Total Construction cost	$ 31,500.00			

RECOMMENDED IMPROVEMENTS TO HIGHWAY 31 LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
2	Install Sump Pump/ Drain for Valve Vault	1	LS	$ 3,500.00	$ 3,500.00	Fair	Medium	LOW
				Contingency (20%)	$ 700.00			
				Total Construction cost	$ 4,200.00			

RECOMMENDED IMPROVEMENTS TO HWY 69 LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	Medium	HIGH
2	Troubleshoot low pumping rate of Pump No.1 during next scheduled pump inspection	1	LS	$ -	$ -	N/A	Medium	MEDIUM
				Contingency (20%)	$ -			
				Total Construction Cost	$ -			

RECOMMENDED IMPROVEMENTS TO HOGAN LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
2	Troubleshoot Pump No. 2 discharge.	1	LS	$ -	$ -	N/A	High	HIGH
3	Address check valve, riser pipe and fittings, repair, clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	N/A	High	HIGH
				Contingency (20%)	$ 500.00			
				Total Construction Cost	$ 3,000.00			

RECOMMENDED IMPROVEMENTS TO NOTTINGHAM LANE LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
2	Address check valve, riser pipe and fittings, repair, clean and seal/paint/coat	1	LS	$ 2,500.00	$ 2,500.00	Poor	Medium	HIGH
3	Site Grading Around Generator Base Slab To Ensure Positive Drainage	1	LS	$ 5,000.00	$ 5,000.00	N/A	Medium	MEDIUM
4	Repair Valve Vault Drain	1	LS	$ 2,000.00	$ 2,000.00	Poor	Low	LOW
5	Install on Site Lighting	1	LS	$ 15,000.00	$ 15,000.00	Poor	Low	LOW
				Contingency (20%)	$ 4,900.00			
				Total Construction Cost	$ 29,400.00			

Table 1-2: Lift Station Improvement Plan Summary

RECOMMENDED IMPROVEMENTS TO PILOT TRUCK LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
2	Relocate Electric Junction Box (nearWet Well) and Air Compressor Off Ground to Vertical Frame with Electrical and Instrumentation Panels	1	LS	$ 15,000.00	$ 15,000.00	Poor	Medium	HIGH
3	Check Functioning and Replace 6" DI check Valves	2	EA	$ 5,000.00	$ 10,000.00	Poor	Medium	HIGH
				Contingency (20%)	$ 5,000.00			
				Total Construction Cost	**$ 30,000.00**			

RECOMMENDED IMPROVEMENTS TO RUSTIC PARK LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Replace 6" D.I. Check Valve	1	EA	$ 5,000.00	$ 5,000.00	Poor	Medium	HIGH
2	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	N/A	High	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
4	Seal Holes Using Link Seal at Points Where Suction Pipes Enter Wet Well	1	LS	$ 1,500.00	$ 1,500.00	N/A	Medium	MEDIUM
5	Line wet well for corrosion protectior	175	SF	$ 75.00	$ 13,125.00	N/A	Medium	MEDIUM
6	Install Lighting on Site	1	LS	$ 15,000.00	$ 15,000.00	Poor	Low	LOW
				Contingency (20%)	$ 7,925.00			
				Total Construction Cost	**$ 47,550.00**			

RECOMMENDED IMPROVEMENTS TO SHORELINE LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	N/A	High	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
				Contingency (20%)	$ 1,000.00			
				Total Construction Cost	**$ 6,000.00**			

RECOMMENDED IMPROVEMENTS TO STEWART LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	N/A	High	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
3	Address check valve, riser pipe and fittings clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	Poor	Medium	HIGH
4	Line wet well for corrosion protectior	377	SF	$ 75.00	$ 29,000.00	N/A	Medium	HIGH
				Contingency (20%)	$ 7,300.00			
				Total Construction Cost	**$ 43,800.00**			

RECOMMENDED IMPROVEMENTS TO UNIVERSITY PARK LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	N/A	High	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
3	Install Package Lift Station with 6 ft Diameter by 10 ft Depth Fiberglass Wet Well	1	LS	$100,000.00	$ 100,000.00	N/A	Medium	MEDIUM
4	Install Strobe and Horn Alarm System	1	LS	$ 1,000.00	$ 1,000.00	N/A	Medium	MEDIUM
5	Install NEMA4X Electrical and Instrumentation Panels	1	LS	$ 50,000.00	$ 50,000.00	N/A	Medium	MEDIUM
				Contingency (20%)	$ 31,200.00			
				Total Construction Cost	**$ 187,200.00**			

Table 1-2: Lift Station Improvement Plan Summary

RECOMMENDED IMPROVEMENTS TO BROOKS LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
2	Rehab and Close electrical conduit on Top of Electric Panel to Avoid Rain Water Entering Panel	1	LS	$ 1,000.00	$ 1,000.00	Poor	Medium	HIGH
3	Site Grading Along Southside Fence	1	LS	$ 10,000.00	$ 10,000.00	Poor	Medium	HIGH
4	Reconnect Strobe Alarm System	1	LS	$ 500.00	$ 500.00	N/A	Medium	MEDIUM
				Contingency (20%)	$ 2,300.00			
				Total Construction Cost	$ 13,800.00			

RECOMMENDED IMPROVEMENTS TO CHARLESTON LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Check For Cause of Failure and Repair/ Replace Pump 1 (Submersible Type-12 HP, 130 GPM)	1	EA	$ 25,000.00	$ 25,000.00	N/A	High	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
3	Inspect For Functionality and Replace 6" DI Surge Valve. (2)	2	EA	$ 5,000.00	$ 10,000.00	Poor	Medium	HIGH
4	Address check valve, riser pipe and fittings clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	Poor	Medium	HIGH
5	Install Cam Lock Quick Connect to Force Main for Portable Pump. (Cost includes valves, fittings, etc. required for connection)	1	LS	$ 5,000.00	$ 5,000.00	Poor	Medium	HIGH
				Contingency (20%)	$ 8,500.00			
				Total Construction Cost	$ 51,000.00			

RECOMMENDED IMPROVEMENTS TO CROSSINGS LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	None. Lift station to be replaced.	0	LS	$ -	$ -	N/A	N/A	
				Contingency (20%)	$ -			
				Total Construction Cost	$ -			

RECOMMENDED IMPROVEMENTS TO EAST GRANDE LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
				Contingency (20%)	$ -			
				Total Construction cost	$ -			

RECOMMENDED IMPROVEMENTS TO FAULKNER LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	None. Closed-packaged system. Most components could not be assessed.	0	LS	$ -	$ -	N/A	N/A	
				Contingency (20%)	$ -			
				Total Construction Cost	$ -			

Table 1-2: Lift Station Improvement Plan Summary

RECOMMENDED IMPROVEMENTS TO GILLEY CREEK LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Provide Flood Protection Wall Around Lift Low-Lying Lift Station (70' L x 4' H x 8" T)	1	LS	$ 50,000.00	$ 50,000.00	Poor	High	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
3	Install Strobe and Horn Alarm System	1	LS	$ 1,000.00	$ 1,000.00	N/A	Medium	MEDIUM
4	Install NEMA4X electric panel on site with phase monitors and triplex transducer controls	1	LS	$ 50,000.00	$ 50,000.00	N/A	Medium	MEDIUM
5	Investigate source of excessive noise.	1	LS	$ 1,000.00	$ 1,000.00	N/A	Medium	MEDIUM
				Contingency (20%)	$ 20,400.00			
				Total Construction Cost	$ 122,400.00			

RECOMMENDED IMPROVEMENTS TO HAMPTONS LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
2	Address check valve, riser pipe and fittings corrosion. Clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	Poor	Medium	HIGH
3	Investigate duplex operation contro	1	LS	$ 1,500.00	$ 1,500.00	N/A	Medium	MEDIUM
4	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	N/A	Medium	MEDIUM
5	Reorient Electric Panel Away From Fence To Allow Access For Maintanance	1	LS	$ 25,000.00	$ 25,000.00	Fair	Low	LOW
				Contingency (20%)	$ 6,800.00			
				Total Construction Cost	$ 40,800.00			

RECOMMENDED IMPROVEMENTS TO OAKS LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	N/A	High	HIGH
				Contingency (20%)	$ -			
				Total Construction Cost	$ -			

RECOMMENDED IMPROVEMENTS SHACKLEFORD CREEK LIFT STATION								
ITEM	DESCRIPTION	QTY.	UNIT	UNIT	TOTAL PRICE	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	EA	$ -	$ -	N/A	High	HIGH
2	Address corrosion/moisture Existing Electrical Panel (first floor)	1	LS	$ 35,000.00	$ 35,000.00	Poor	Medium	HIGH
3	Address check valve, riser pipe and fittings corrosion. Clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	Poor	Medium	HIGH
4	Curtain Wall Grout Foundation and Building Wall on Westside	1	LS	$ 10,000.00	$ 10,000.00	N/A	Medium	MEDIUM
5	Replace Level Float	1	EA	$ 1,000.00	$ 1,000.00	Poor	Low	MEDIUM
				Contingency (20%)	$ 9,700.00			
				Total Construction Cost	$ 58,200.00			

Total Construction Cost =	*$888,330.00*
Engineering Services (10%) =	*$ 88,850.00*
Administrative Fee (30%) =	*$ 266,500.00*
TOTAL PROJECT COST =	*$1,243,680.00*

2. Introduction

The City of Tyler covers an area of almost 53 square miles and has a population of over 104,000 (2016). The Tyler Water Utility maintains a wastewater system for over 30,000 customers. The wastewater system comprises of two wastewater treatment plants (WWTP) - The Southside Plant and the Westside Plant along with 24 lift stations and over 3 million feet of sewer collection lines.

Lift stations represent a vital element of any wastewater collection system. Lift stations are used to maintain sufficient hydraulic head while conveying wastewater throughout the system. Due to the topographical conditions and practical difficulties in laying sewer lines deep enough to achieve sufficient head, gravity flow is not available in many areas for wastewater conveyance and lift stations are required to convey wastewater to desired destinations.

At present, the City of Tyler owns 24 lift stations which are used to convey wastewater from different parts of the system to the two (2) WWTPs. Regular lift station inspections are needed to ensure that all mechanical, structural, and electrical components of the lift station are functioning properly and that any foreseeable maintenance issues may be promptly addressed.

2.1 Purpose and Scope

The purpose of this project is to assist the Tyler Water Utilities (TWU) staff by assessing the lift stations in Tyler's collection system and providing a Lift Station Condition Assessment Report and Implementation Plan to recommend improvements for avoiding SSOs in the future. The scope of the project involves performing a visual condition assessment and pump drawdown testing for the 24 lift stations in Tyler. This assessment encompasses all major lift stations components including the following (where applicable):

- Building structure and overall site appearance
- Wet well/dry well information
- Security and safety features
- Piping and valves
- Motors and pumping information
- Pump performance information
- Electrical system and SCADA
- Odor control facilities

LNV staff performed the condition assessment of all lift stations in Tyler during the week of December 11 to December 18, 2017. In addition to this visual condition assessment, Pipeline Analysis conducted pump drawdown tests for 21 of 24 lift stations. Two lift stations where performing drawdown testing was not possible, were Faulkner Park and Oak Creek lift station. The Faulkner Park lift station is an enclosed grinder pump system that had no access for performing drawdown tests and the Oak Creek lift station is new with insufficient influent flow to run tests. The Brooks lift station has a complex wet well geometry

and results of the drawdown test were suspect. The results for the drawdown tests for each lift station are presented in **Appendix B.**

Table 2-1 and **Figure 2-1** show all 24 lift stations in the South and West Basin of Tyler. The findings of the condition assessment for all lift stations are documented in this report along with a Lift Station Implementation Plan containing a prioritized list of recommendations, associated costs and anticipated schedules. **Appendix A** presents documentation pertaining to each lift station including the location map, condition assessment forms, photographs, lift station plans and pump curves.

The Capacity, Management, Operation and Maintenance (CMOM) Plan addresses lift station failures and the procedures used by TWU during such outages. Standard Operating Procedures (SOPs) have been prepared for training and guidance to staff in dealing with lift station outages. Existing standby generators, electrical quick connections for portable generators, force main quick connections for portable pumps and jet-vac truck(s) for pumping and transporting wastewater during outages are all methods currently implemented to address lift station outages. Table 2-1 presents the current power failure backup methods employed by TWU.

Table 2-1: List of Lift Stations

Item	Lift Station Name	Power Failure Backup	Address	Asset ID	No. of Pumps	Design Capacity (gpm)	Firm Capacity* - gpm
1	Animal Shelter	Jet-vac	1847 C R 386	SS.LS.T0000003	2	52	40
2	Bellwood	Force Main Cam Lock Connect	10362 C R 1138	SS.LS.T0000007	2	1097	276
3	Brooks	Electrical Quick Connect Plug	92414 QUIET WATER	SS.LS.T0000018	2	278	No Test (Wet Well Geometry)
4	Charleston	Jet-vac	2916 SAVANNAH CRK	SS.LS.T0000002	2	130	189
5	CR 46	Generator & Electrical Quick Connect	15750 C R 46	SS.LS.T0000013	2	2500	2268
6	Crossing	Electrical Quick Connect Plug	7761 CROSS RD	SS.LS.T0000012	2	313	309
7	Dixie	Electrical Quick Connect Plug	168 EISENHOWER DR	SS.LS.T0000025	2	132	40
8	East Grande	Electrical Quick Connect Plug	13692 SYDNEY RD	SS.LS.T0000042	2	500	551
9	Faulkner	Jet-vac	460 W CUMBERLAND RD	SS.LS.T0000023	2	1	No Test (Low flow)
10	Gilley Creek	Force Main Cam Lock Connect	9127 C R 2120	SS.LS.T0000005	3	2201	1312
11	Greenbriar	Force Main Cam Lock Connect	10936 SPUR 164	SS.LS.T0000006	2	1000	730
12	Hamptons	Jet-vac	4274 OLD OMEN RD	SS.LS.T0000019	2	354	180
13	Haverhill	Jet-vac	3970 C R 219	SS.LS.T0000001	2	694	139
14	Highway 31 W	Generator & Force Main Cam Lock Connect	13933 STATE HWY 31 WEST	SS.LS.T0000043	2	222	233
15	Highway 69 N	Generator & Electrical Quick Connect Plug	12808 HWY 69 N	SS.LS.T0000014	2	510	250
16	Hogan	Generator & Force Main Cam Lock Connect	3984 HOGAN DR	SS.LS.T0000020	2	721	242
17	Nottingham	Generator & Electrical Quick Connect Plug	9799 C R 274	SS.LS.T0000011	2	353	116
18	Oak Creek	Generator	2551 Oak Creek Blvd	SS.LS.T0000044	2	470	No Test (Low Flow)
19	Pilot	Generator	12292 FM 14	SS.LS.T0000024	2	278	92
20	Rustic	Jet-vac	3284 N NORTHEAST LOOP 323	SS.LS.T0000004	2	191	126
21	Shackleford	Generator & Force Main Cam Lock Connect	9125 CHEROKEE TRL	SS.LS.T0000010	2	500	487
22	Shoreline	Jet-vac	4588 CASCADE SHORELINE DR	SS.LS.T0000021	2	79	160
23	Stewart	Jet-vac	11948 GREENBRIAR LAKE RD	SS.LS.T0000022	2	79	34
24	University Park	Jet-vac	3996 DUCHESS DR	SS.LS.T0000008	2	87	104

*Firm Capacity - Largest Pump Out of Service

No Test - Firm Capacity to be determined from Hydraulic Model

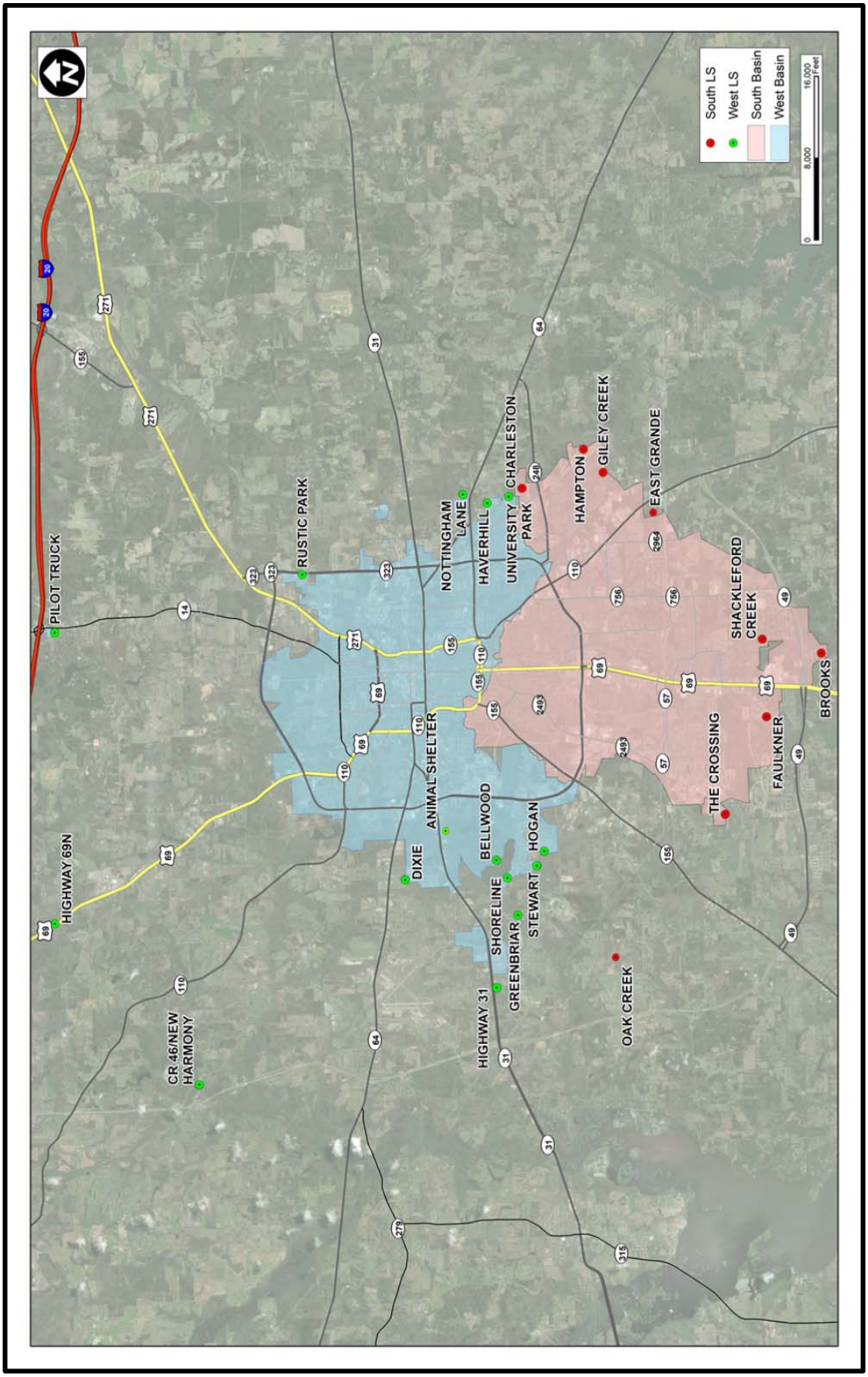

Figure 2-1: Location Map of Lift Stations

2.2 Methodology

The condition assessment of the lift stations was performed by LNV staff with assistance from TWU staff. TWU staff provided access to each lift station and its components including security gates, access hatches, and control panels. LNV staff performed a visual assessment of the components found at each of the lift stations and took photographs. No components of the lift station were disassembled during the lift station assessment. Submersible pumps were not pulled from the wet wells for visual assessment purposes. Each component was given one of the following assessment ratings: 1) Good; 2) Fair; 3) Poor; Condition and 4) Criticality of Component; or 5) Not applicable.

Appendix C shows the sample condition assessment form used for documenting the condition assessment at each lift station. **Appendix D** describes the criteria that were used to develop the form and assign the appropriate rating to each component. "Not applicable" was used for components that were not present at the lift station at the time of the assessment or for components that were not assessed due to lack of access (e.g., internal submersible pump components). Further information on the general operational conditions, maintenance issues, electrical, instrumentation and lighting needs was also obtained by discussion with staff and lift station operators. The condition assigned to each lift station component using these criteria along with the criticality of the component was then used to assign a priority/ risk associated with each component of the lift station.

Pipeline Analysis performed the pump drawdown tests to determine the real-time discharge from each lift station. For this purpose, the cross-sectional area of the wet well was calculated. The drawdown and return depth was fixed and the drawdown time and return time was calculated for each pump operating separately as well as in combination. This process was performed three (3) times for each pump and an average value of the pumping rate was determined for each pump operating alone as well as in combination with other pumps.

3. Findings and Recommendations- West WWTP Basin Lift Stations

The West WWTP Basin has 15 lift stations. In this section, the condition assessment observations for all 15 West Basin lift stations are presented followed by prioritized list of recommendations for improvements and corresponding cost estimates.

Additional information for each lift station including lift station location maps, condition assessment forms, on-site photographs and lift station plans and pump curves (if available) are presented in **Appendix A.**

3.1 ANIMAL SHELTER LIFT STATION

3.1.1 INTRODUCTION

The Animal Shelter lift station is located at 1847 CR 386 in the West WWTP basin. The site consists of a wet well, submersible pumps and electrical and instrumentation panels. The lift station is a submersible type and was constructed in 2001. It is a relatively small lift station and has two (2) pumps of 3 HP rating and 52 GPM (gallons per minute) pumping capacity each. The wet well has a diameter 4 feet and depth of 7 feet.

The condition assessment of the Animal Shelter Lift Station was performed on December 11, 2017. The following are some general observations based on the condition assessment:

- The overall site appearance is fair with the perimeter fencing in good condition. Due to poor surface drainage, there is some erosion on site that might compromise the perimeter fence and metal wet well cover in the future.
- The wet well is in good condition with the only area of concern being the debris and dirt deposit in the wet well and on the hatch.
- Two (2) PVC discharge valves were observed inside the wet well and the valves were in good condition. No check valve was observed. The wet well also has discharge piping, riser piping and fittings, all of which are in good condition. Additionally, the wet well still has old, disconnected pipe that is no longer in service.
- The submersible pumps were not visible during inspection. However, based on input from TWU staff it was found that only one (1) of the two (2) pumps was in service since the electrical breaker on the other pump was missing.
- The electrical and instrumentation panels were in good condition. However, the electrical panel was missing a breaker for a pump.
- While performing the Pump Drawdown Tests, it was observed that one pump was out of service.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

3.1.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Install Electric Breaker for one Pump	Poor	High	HIGH
2	Install Cam Lock Quick Connect to Force Main for Portable Pump. (Cost includes valves, fittings, etc. required for connection)	Poor	Medium	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
4	Install Flood Light on Site	N/A	Low	LOW

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO ANIMAL SHELTER LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Install Electric Breaker for one Pump	1	LS	$ 300.00	$ 300.00	HIGH
2	Install Cam Lock Quick Connect to Force Main for Portable Pump. (Cost includes valves, fittings, etc. required for connection)	1	LS	$ 5,000.00	$ 5,000.00	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	-	-			HIGH
4	Install Flood Light on Site	1	EA	$ 15,000.00	$ 15,000.00	LOW
				Contingency (20%)	$ 4,060.00	
				Total Construction cost	**$ 24,360.00**	

3.2 BELLWOOD LIFT STATION

3.2.1 INTRODUCTION

The Bellwood lift station is located at 10362 CR 1138, in the West WWTP basin. The lift station consists of a fiberglass dog house, dry well, pumps, electrical and instrumentation panels. The lift station is a self-priming type lift station and was constructed in 1979. It has two (2) pumps of 30 HP rating and 1097 GPM pumping capacity each. The wet well has a diameter 6 feet and depth of 18.5 feet.

The condition assessment of the Bellwood Lift Station was performed on December 18, 2017. The following are some general observations based on the condition assessment:

- The overall site appearance is fair. There are minor odor problems on site and damage caused to the asphalt driving pavement due to poor surface drainage.
- The dog house itself is in good condition but the wall fan inside is disconnected and not operational. Additionally, the latch on the door to the dog house is broken.
- The manhole lid on the gravity influent line to the lift station is also broken.
- At present, the site has old mercury vapor lights.
- The wet well is in poor condition with significant debris, fat, oil and grease deposits. The continued exposure to corrosive environment has also caused damage to the concrete walls in the wet well.
- Two (2) DI 6 inch check valves were observed on site. One (1) was fairly new and in good condition whereas the other had some amount of corrosion. Two (2) 6 inch DI discharge valves were also observed and these were in fair condition.
- The 6 inch DI riser piping in the wet well and the couplings were corroded. Some amount of corrosion was also observed on the 8 inch discharge piping and fittings though these were in fair condition.
- The electrical panel on site was not a NEMA4X panel.
- This lift station has force main Cam Lock Quick Connect that is utilized by a portable pump during power outage.
- An ultrasonic level and visual alarm were also observed on site though no RTU was observed.
- While performing the Pump Drawdown Tests, it was observed that the Pump 2 was out of service.

3.2.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Install Stainless Steel I/I Inhibitor at Wet Well Access Manhole	N/A	High	HIGH
2	Replace Manhole Lid on Gravity Influent Line	N/A	High	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	Poor	High	HIGH
4	Line Wet Well for Corrosion Protection	Poor	Medium	HIGH
5	Install NEMA4X Electrical Panels	Fair	Medium	MEDIUM
6	Replace on Site Lighting	Poor	Low	LOW
7	Replace Latch on Dog House Door	Fair	Low	LOW

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST
RECOMMENDED IMPROVEMENTS TO BELLWOOD LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Install Stainless Steel I/I Inhibitor at Wet Well Access Manhole	1	LS	$ 250.00	$ 250.00	HIGH
2	Replace Manhole Lid on Gravity Influent Line	1	LS	$ 2,500.00	$ 2,500.00	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
4	Line Wet Well for Corrosion Protection	363	SF	$ 75.00	$ 28,000.00	HIGH
5	Install NEMA4X Electrical Panels	1	LS	$ 50,000.00	$ 50,000.00	MEDIUM
6	Replace on Site Lighting	1	LS	$ 15,000.00	$ 15,000.00	LOW
7	Replace Latch on Dog House Door	1	LS	$ 100.00	$ 100.00	LOW
				Contingency (20%)	$ 19,170.00	
				Total Construction cost	**$ 115,020.00**	

3.3 CR 46 NEW HARMONY LIFT STATION

3.3.1 INTRODUCTION

The CR 46 New Harmony Lift Station is located at 15750 CR 46, in the West WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, pumps, electrical and instrumentation panels, back-up power generator and transfer switch. The lift station is a submersible type lift station and has two (2) pumps of 107 HP rating and 2500 GPM pumping capacity each. The wet well has a cross sectional area of 347 sq. ft. and a depth of 21.9 ft.

The condition assessment for the New Harmony Lift Station was performed on December 15, 2017. The following are some general observations made during the condition assessment:

- The overall site appearance of the lift station was good. At the time of inspection, a part of the fencing of the lift station had collapsed due to erosion around the area. Since the time, the TWU staff has repaired the fencing for the lift station.
- The lift station still needs site grading and erosion control to prevent damage to the lift station, especially near the rear gate to the lift station.
- The wet well and the valve vault for the lift station were in good condition. However, the valve vault ventilation pipe for the dry well requires recoating.
- The lift station has two (2) pumps on site with a provision for a third pump. There are two (2) 12 inches DI check valves and three (3) 12 inch DI discharge valves in the valve vault that are in good condition.
- An additional surge valve was also observed on site. According to input from TWU staff, this surge valve often trips and causes pumps to short out.
- The 12 inch DI riser piping and fittings in the dry well were observed to have some amount of corrosion.
- The electrical and instrumentation panels on site were in good condition. An electric generator with quick connect plug was also present on site for back-up power generation.

3.3.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	Poor	High	**HIGH**
2	Inspect For Functionality and Replace 12" DI Surge Valve.	Fair	Medium	**MEDIUM**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST RECOMMENDED IMPROVEMENTS TO CR 46 NEW HARMONY LIFT STATION						
ITEM	**DESCRIPTION**	**QTY.**	**UNIT**	**UNIT PRICE**	**TOTAL PRICE**	**PRIORITY**
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
2	Inspect For Functionality and Replace 12" DI Surge Valve.	1	EA	$ 18,000.00	$ 18,000.00	**MEDIUM**
				Contingency (20%)	$ 3,600.00	
				Total Construction cost	**$ 21,600.00**	

3.4 DIXIE LIFT STATION

3.4.1 INTRODUCTION

The Dixie lift station is located at 168 Eisenhower Drive, in the West WWTP basin of Tyler. The lift station site consists of a dog house, wet well, pump and electrical panel. The lift station is a submersible type and was originally constructed in 1987.The lift station is relatively small and contains two (2) pumps of 10 HP rating and 132 GPM pumping capacity each. The wet well has a diameter of 6 feet and depth of 13.8 ft.

The condition assessment of the Dixie Lift Station was performed on December 15, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair. At the time of the condition assessment, the dog house cover was in critical condition since it had broken in places due to a tree fall.
- There was no light inside the dog house and the exterior light on site had broken. The lift station concrete slab was also flush with the ground which allows surface water to enter the dog house and potentially damage equipment.
- The door of the dog house was not attached to the hinge and was jammed. The latch on the door was also broken.
- The grade of the site would not allow the vehicular gate to completely open.
- The wet well had significant amount of debris and the concrete walls had deteriorated.
- Two (2) 4 inch check valves and two (2) 4 inch discharge valves made of ductile iron were observed on site. The valves were in fair condition.
- The 3-inch Rise pipe was in poor condition below the wet well slab and showed significant corrosion. The pipe was in good condition above the slab. The discharge pipe and fittings in the dry well were also in fair condition.
- The electric panel enclosure was in poor condition and would not close shut. The latch on the panel door was also not operational.
- No RTU was observed on site. The site had an ultrasonic float and a visual alarm system.
- Electrical quick connect plug is installed for use with portable generator during power outage.

3.4.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	Poor	High	HIGH
2	Replace Dog House Cover	Critical	High	HIGH
3	Replace Electrical Panel Enclosure	Poor	Medium	HIGH
4	Coat Wet Well To Avoid Further Concrete Deterioration	Poor	Medium	HIGH
5	Install Stainless Steel I/I Inhibitor at Wet Well	N/A	Medium	MEDIUM
6	Install Exterior and Interior Light	Poor	Low	LOW

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST
RECOMMENDED IMPROVEMENTS TO DIXIE LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
2	Replace Dog House Cover	1	LS	$ 10,000.00	$ 10,000.00	HIGH
3	Replace Electrical Panel Enclosure	1	LS	$ 15,000.00	$ 15,000.00	HIGH
4	Coat Wet Well To Avoid Further Concrete Deterioration	260	SF	$ 45.00	$ 12,000.00	HIGH
5	Install Stainless Steel I/I Inhibitor at Wet Well	1	EA	$ 250.00	$ 250.00	MEDIUM
6	Install Exterior and Interior Light	1	LS	$ 10,000.00	$ 10,000.00	LOW
				Contingency (20%)	$ 9,450.00	
				Total Construction Cost	**$ 56,700.00**	

3.5 GREENBRIAR LIFT STATION

3.5.1 INTRODUCTION

The Greenbriar lift station is located at 10936 Spur 164, in the West WWTP basin of Tyler. The lift station site consists of a brick building, wet well and electrical and instrumentation panels. The lift station is a self-priming type lift station and was originally constructed in 1974 and has two (2) pumps of 40/50 HP rating and 1000 GPM pumping capacity each. The wet well has a dimension of 25 feet by 39 feet and depth of 14 feet.

The condition assessment of the Greenbriar Lift Station was performed on December 17, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair. The driveway to the lift station was in poor condition due to accumulation of silt and water accumulation was noticed on the East side of the lift station building due to inadequate grading and surface drainage.
- At the time of the assessment, it was observed that the electrical panels in the building were in poor condition. The TWU staff has since then already begun work to repair the panel and the work is anticipated to be complete by April 2018.
- The lift station building itself was in good condition. However, the water line inside the building was leaking leading to water accumulation on the floor of the building. Some corrosion was also noticed on the building doors, fence and gate of the lift station building and perimeter.
- The wet well was observed to be in fair condition. Two (2) pumps were functional while a third pump was present but was not connected at the time. The lift station also had provisions for a fourth pump.
- The slab cover for future fourth pump was broken and in poor condition and poses a safety hazard.
- The 8 inch ductile iron riser pipe was in poor condition and some corrosion was also noticed on the pump frames.
- A float level was observed on site and it was in fair condition.
- Force main cam lock connections are available during power outage to connect portable pump.

3.5.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	Poor	High	**HIGH**
2	Repair 2" PVC Water Line Inside Building	Poor	High	**HIGH**
3	Remove and Replace place Damaged 2 ft by 2 ft DI Slab Cover for Future Pump With FRP Cover	Poor	Medium	**HIGH**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO GREENBRIAR LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
2	Repair 2" PVC Water Line Inside Building	1	LS	$ 500.00	$ 500.00	**HIGH**
3	Remove and Replace Damaged 2 ft by 2 ft DI Slab Cover for Future Pump With FRP Cover	1	LS	$ 1,000.00	$ 1,000.00	**HIGH**
				Contingency (20%)	$ 300.00	
				Total Construction Cost	**$ 1,800.00**	

3.6 HAVERHILL LIFT STATION

3.6.1 INTRODUCTION

The Haverhill lift station is located at 3970 County Road 219, in the West WWTP basin of Tyler. The lift is a self-priming type and was originally constructed in 1984. The lift station site consists of a fiberglass reinforced plastic (FRP) dog house, wet well, pumps, electrical and instrumentation panels. The two (2) pumps present on site are of 25 HP rating and 695 GPM pumping capacity each. The wet well has a diameter of 8 feet and a depth of 11.5 feet.

The condition assessment of the Haverhill Lift Station was performed on December 13, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair. The site grading at the lift station grounds needs to be improved. At places, the side of the dog house slab is level with natural ground and could potentially lead to water entering the dog house during a wet weather event.
- The chain link fence around the lift station perimeter showed minor signs of corrosion and aging. It will need to be scheduled for replacement in 5- 10 years.
- The dog house was in good condition however the existing door to the dog house provides very limited access for service. The dog house itself can slide in either direction to provide access to equipment.
- There was significant debris deposit in the wet well including some fat, oil and grease deposit.
- The access manhole lid had a 2.5-inch hole in the center allowing for inflow into the wet well. This issue could potentially be addressed either by replacing the manhole cover or by installing a stainless steel inflow inhibitor
- Two (2) 6 inch ductile iron check valves and one (1) ductile iron discharge valve were observed on site. On visual assessment, the valves were in fair condition. However, while conducting pump performance tests it was observed that the check valve for one pump did not close.
- The riser pipe and the fittings in the wet well were corroded and in poor condition.
- Grease, oil and metal shavings were observed around the pump motor frames.
- The electric panel enclosure on site was observed to be in fair condition. The panel could not be opened for inspection.
- The antenna for the panel was disconnected and no alarms were observed on site.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

3.6.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
2	Replace 6-inch D.I. Check Valve	Poor	High	HIGH
3	Install Force Main Cam Lock for use with backup pumps	N/A	High	HIGH
4	Replace Wet Well Access Manhole Lid	Poor	Medium	HIGH
5	Site Grading Around Dog House To Ensure Positive Drainage	N/A	Medium	MEDIUM
6	Replace Riser Piping and Fittings in Wet Well	Poor	Low	MEDIUM
7	Install Stainless Steel Inflow Inhibitor at Wet Well Access Manhole	N/A	Medium	MEDIUM
8	Install Strobe and Horn Alarm System	N/A	Medium	MEDIUM

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO HAVERHILL LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
2	Replace 6-inch D.I. Check Valve	1	LS	$ 5,000.00	$ 5,000.00	HIGH
3	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	HIGH
4	Replace Wet Well Access Manhole Lid	1	LS	$ 1,000.00	$ 1,000.00	HIGH
5	Site Grading Around Dog House To Ensure Positive Drainage	1	LS	$ 5,000.00	$ 5,000.00	MEDIUM
6	Replace Riser Piping and Fittings in Wet Well	1	LS	$ 5,000.00	$ 5,000.00	MEDIUM
7	Install Stainless Steel Inflow Inhibitor at Wet Well Access Manhole	1	LS	$ 250.00	$ 250.00	MEDIUM
8	Install Strobe and Horn Alarm System	1	LS	$ 5,000.00	$ 5,000.00	MEDIUM
			Contingency (20%)		$ 5,250.00	
				Total Construction cost	**$ 31,500.00**	

3.7 HIGHWAY 31

3.7.1 INTRODUCTION

The Highway 31 lift station is located at 13933 State Highway 31 West, in the West WWTP basin of Tyler. The lift station site consists of a wet well, pumps, electrical and instrumentation panels. The lift station is a submersible type and was constructed in 2016. It has two (2) pumps of 320 GPM pumping capacity each. The wet well has a diameter of 6 feet and a depth of 18 feet.

The condition assessment of the Highway 31 Lift Station was performed on December 17, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good. The lift station grounds, fencing and pavement were in good condition.
- The wet well and the valve vault were in good condition though about 2 inches of standing water was observed in the valve vault. The valve vault also did not have any sump pumps or drains for drainage.
- All pipes and valves were in good condition.
- New and updated electrical and instrumentation panels were present on site. An electrical generator for back-up power was also present.
- Visual and sound alarms, an ultrasonic float level, RTU uplink and antenna were also observed on site.
- Force main cam lock is installed to provide portable pump connection during outage.

3.7.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	**HIGH**
2	Install Sump Pump/ Drain for Valve Vault	Fair	Medium	**LOW**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO HIGHWAY 31 LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
2	Install Sump Pump/ Drain for Valve Vault	1	LS	$ 3,500.00	$ 3,500.00	**LOW**
				Contingency (20%)	$ 700.00	
				Total Construction cost	**$ 4,200.00**	

3.8 HIGHWAY 69N LIFT STATION

3.8.1 INTRODUCTION

The Highway 69N lift station is located at 12808 Highway 69 North, in the West WWTP basin of Tyler. The lift station site consists of a wet well, surge vault, pumps, electrical and instrumentation panels. The lift station is a submersible type and was originally constructed in 2011 and is fairly new. It has two (2) pumps of 20 HP rating and 510 GPM pumping capacity each. The wet well a diameter of 8 feet and a depth of 24.5 feet.

The condition assessment of the Highway 69N Lift Station was performed on December 13, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good. The lift station grounds, fencing and pavement were in good condition. Some erosion was observed along the North fence line and on the West side.
- There was observed debris, fat, oil and grease deposits in the wet well. The wet well concrete and coatings were in fair condition with some minor pitting observed on the wet well walls.
- A valve vault and a separate surge valve vault were observed on site. Both of these were in good condition.
- The 8 inch ductile iron riser pipe and fittings showed some corrosion and were in fair condition. The two (2) 8 inch ductile iron check valves and the 8 inch ductile iron discharge valve were in good condition.
- The electrical panel was a NEMA4X and was in good condition. An electric generator and transfer switch were also observed on site.
- The lift station had an ultrasonic high water float level along with a RTU and antenna placed on the instrumentation panel. No visual or sound alarms were observed on site.
- While performing pump drawdown tests, it was observed that Pump 1 was pumping at much lower rate than Pump 2.
- Force main cam lock is installed to provide portable pump connection during outage.

3.8.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENTS

The condition assessment of The Highway 69N lift station identified several deficiencies in the lift station. However, since this lift station is new these concerns can be addressed during regularly scheduled maintenance. No recommendations for improvements are suggested at this lift station.

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
2	Troubleshoot low pumping rate of Pump No.1 during next scheduled pump inspection	N/A	Medium	MEDIUM

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO HWY 69 LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
2	Troubleshoot low pumping rate of Pump No.1 during next scheduled pump inspection	1	LS	$ -	$ -	MEDIUM
				Contingency (20%)	$ -	
				Total Construction Cost	**$ -**	

3.9 HOGAN LIFT STATION

3.9.1 INTRODUCTION

The Hogan lift station is located at 3984 Hogan Drive, in the West WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, pumps, electrical and instrumentation panels. The lift station was originally constructed in 2008. It is a submersible type lift station and has two (2) pumps of 25 HP rating and 516 GPM pumping capacity each. The wet well has a dimension of 12 feet by 12 feet and a depth of 15 feet.

The condition assessment of the Hogan Lift Station was performed on December 12, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good.
- The condition of the perimeter fence and the driveway were good. The vehicular gate did not close properly.
- Some erosion was observed on site that undermines the wet well slab perimeter.
- Significant fat, oil and grease deposits were observed in the wet well. The wet well wall concrete was in fair condition and an air compressor was present to aerate the wet well.
- The valve vault was 4’6”x 4’6” and in good condition.
- Two (2) 4-inch ductile iron check valves were observed. The valves, riser piping and fittings had significant corrosion and were in poor condition.
- Four (4) 4-inch ductile iron discharge valves were observed. There was one (1) discharge valve between two (2) discharge lines. The valves were in fair condition.
- A NEMA4X electric panel was observed and was in good condition.
- A transfer switch and electric generator were present on site for backup power.
- The site also had an ultrasonic level in good condition along with a visual alarm, RTU uplink and antenna.
- While performing pump drawdown tests, it was observed that even though Pump 2 was operating but was not pumping.
- Force main cam lock is installed to provide portable pump connection during outage.

3.9.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

The condition assessment of The Hogan lift station identified several deficiencies in the lift station. The following recommendations should be addressed by staff during regular maintenance and follow-up work orders generated, if needed.

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	**HIGH**
2	Troubleshoot Pump No. 2 discharge.	N/A	High	**HIGH**
3	Check Valve, riser pipe and fittings	N/A	High	**HIGH**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO HOGAN LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
2	Troubleshoot Pump No. 2 discharge.	1	LS	$ -	$ -	**HIGH**
3	Address check valve, riser pipe and fittings, repair, clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	**HIGH**
				Contingency (20%)	$ 500.00	
				Total Construction cost	**$ 3,000.00**	

3.10 NOTTINGHAM LANE LIFT STATION

3.10.1 INTRODUCTION

The Nottingham Lane lift station is located at 9799 County Road 274, in the West WWTP basin of Tyler. The lift station was originally constructed in 2009 and consists of a wet well, valve vault, pumps, electrical and instrumentation panel and an electric generator. It is a submersible type lift station and has two (2) pumps of 35 HP rating and 353 GPM pumping capacity each. The wet well has a diameter of 8 feet and a depth of 20 feet.

The condition assessment of the Nottingham Lane Lift Station was performed on December 13, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair.
- The lift station is located adjacent to a creek.
- Erosion was observed along exposed fence pole piers and the lighting on site was also broken.
- The wet well has significant fat, oil and grease deposit but was in good condition.
- Two (2) ductile iron check valves, two (2) ductile iron discharge valves, riser pipe, discharge pipe and fittings in the wet well were observed to have significant corrosion and were in poor condition.
- The valve vault drain was observed to be in poor condition.
- An electric generator was present on site along with a transfer switch for back-up power. The slab on which the electric generator is placed was observed to be flush with the natural ground. This allows for surface drainage to come in contact with the generator base support.
- The level floats were in fair condition with some FOG debris accumulated.
- An RTU uplink and a small attached antenna were also observed.

3.10.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
2	Address check valve, riser pipe and fittings clean and seal/paint	Poor	Moderate	HIGH
3	Site Grading Around Generator Base Slab To Ensure Positive Drainage	N/A	Medium	MEDIUM
4	Repair Valve Vault Drain	Poor	Low	LOW
5	Install on Site Lighting	Poor	Low	LOW

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO NOTTINGHAM LANE LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
2	Address check valve, riser pipe and fittings corrosion. Clean and seal/paint/coat.	1	LS	$ 2,500.00	$ 2,500.00	HIGH
3	Site Grading Around Generator Base Slab To Ensure Positive Drainage	1	LS	$ 5,000.00	$ 5,000.00	MEDIUM
4	Repair Valve Vault Drain	1	LS	$ 2,000.00	$ 2,000.00	LOW
5	Install on Site Lighting	1	LS	$ 15,000.00	$ 15,000.00	LOW
				Contingency (20%)	$ 4,900.00	
				Total Construction Cost	**$ 29,400.00**	

3.11 PILOT TRUCK LIFT STATION

3.11.1 INTRODUCTION

The Pilot Truck lift station is located at 12292 FM 14, in the West WWTP basin of Tyler. The lift station was originally constructed in 2009 and is a relatively small lift station consisting of a wet well, valve vault, pumps, electrical and instrumentation panel and an electric generator. It is a submersible type lift station and has two (2) pumps of 17 HP rating and 277 GPM pumping capacity each. The wet well has a diameter of 6 feet and a depth of 12 feet.

The condition assessment of the Pilot Truck Lift Station was performed on December 18, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good. A minor amount of odor was noticed on site.
- The wet well was observed to be relatively clean with only some aggregate being exposed on the lower levels of the wet well. The wet well concrete and coating were in fair condition.
- The valve vault was in good condition though the ventilation pipe showed signs of corrosion.
- At the time of inspection, Pump 1 was observed to be in poor condition. Pump drawdown tests revealed that Pump 1 was pumping at much lower rate than Pump 2. TWU staff initiated repairing the pump.
- The two (2) 6-inch ductile iron check valves were significantly corroded and in poor condition.
- An electric generator and transfer switch were observed on site.
- An ultrasonic level was observed and was in good condition. The lift station also had a visual and sound alarm system along with a RTU uplink and antenna mounted on a light pole.
- The electrical and instrumentation panels were mounted on a steel frame on the East side of the lift station perimeter. An electrical junction box and an air compressor were observed on the ground near the wet well and the steel frame respectively.

3.11.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	**HIGH**
2	Relocate Electric Junction Box (nearWet Well) and Air Compressor Off Ground to Vertical Frame with Electrical and Instrumentation Panels	Poor	Medium	**HIGH**
3	Check Functioning and Replace 6" DI Check Valves (2)	Poor	Medium	**HIGH**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO PILOT TRUCK LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
2	Relocate Electric Junction Box (nearWet Well) and Air Compressor Off Ground to Vertical Frame with Electrical and Instrumentation Panels	1	LS	$ 15,000.00	$ 15,000.00	**HIGH**
3	Check Functioning and Replace 6" DI Check Valves	2	EA	$ 5,000.00	$ 10,000.00	**HIGH**
				Contingency (20%)	$ 5,000.00	
				Total Construction Cost =	**$ 30,000.00**	

3.12 RUSTIC PARK LIFT STATION

3.12.1 INTRODUCTION

The Rustic Park lift station is located at 3284N NE loop 323, in the West WWTP basin of Tyler. The lift station site consists of a dog house, wet well, valve vault, pumps, electrical and instrumentation panels. The lift station is relatively small and is a self-priming type lift station. It has two (2) pumps of 10 HP rating and 191 GPM pumping capacity each. The wet well has a diameter of 6 feet and a depth of 9 feet.

The condition assessment of the Rustic Park Lift Station was performed on December 11, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair. The dog house and perimeter fencing were in good condition. However, the lighting on site was disconnected and silt deposition due to insufficient surface drainage inhibited the opening of the dog house cover completely. Additionally, the center roof beam of the dog house was corroded.
- The wet well was observed to have a significant amount of debris. The concrete walls of the wet well had deteriorated due to exposure to corrosive environment and were in poor condition.
- Gaps were observed where suction pipes entered wet well.
- The two (2) check valves and the two (2) discharge valves were observed to be in fair condition. However, during the pump drawdown tests it was determined that check valve for Pump 1 did not close.
- The riser pipe, discharge pipe and fittings were corroded and in poor condition. Some amount of corrosion was also observed on bolts and fittings.
- Oil and grease were visible near the motor of the pumps. Pump 2 motor had some amount of corrosion.
- The electric panel enclosure was in fair condition with corrosion observed on panel hinges and closure bolts.
- No visual or sound alarms were observed on site. The ultrasonic level was in fair condition and a RTU uplink and antenna were also observed on site.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

3.12.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Replace 6" D.I. Check Valve	Poor	Medium	HIGH
2	Install Force Main Cam Lock for use with backup pumps	N/A	High	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
4	Seal Holes Using Link Seal at Points Where Suction Pipes Enter Wet Well	N/A	Medium	MEDIUM
5	Line Wet Well for corrosion protection.	N/A	Medium	MEDIUM
6	Install Lighting on Site	Poor	Low	LOW

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO RUSTIC PARK LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Replace 6" D.I. Check Valve	1	EA	$ 5,000.00	$ 5,000.00	HIGH
2	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	HIGH
3	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
4	Seal Holes Using Link Seal at Points Where Suction Pipes Enter Wet Well	1	LS	$ 1,500.00	$ 1,500.00	MEDIUM
5	Line Wet Well for corrosion protection.	175	SF	$ 75.00	$ 13,125.00	MEDIUM
6	Install Lighting on Site	1	LS	$ 15,000.00	$ 15,000.00	LOW
				Contingency (20%)	$ 7,925.00	
				Total Construction cost	**$ 47,550.00**	

3.13 SHORELINE LIFT STATION

3.13.1 INTRODUCTION

The Shoreline lift station is located at 4588 Cascade Shoreline Drive, in the West WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, pumps, electrical and instrumentation panels. The lift station was originally constructed in 2006 and is a submersible type lift station. It has two (2) pumps of 7 HP rating and 80 GPM pumping capacity each. The wet well has a dimension of 7 feet by 7 feet and a depth of 17 feet.

The condition assessment of the Shoreline Lift Station was performed on December 17, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair. The site ground and pavement were observed to be in good condition.
- The wet well and valve vault were observed to be in good condition.
- Two (2) 4 inch ductile iron check valves were observed on site. While one (1) check valve was in good condition, the other showed some corrosion.
- The 4 inch ductile iron discharge valve, riser pipe, discharge pipe and fittings were all in fair condition.
- A NEMA4X electrical panel was present on site and was observed to be in good condition.
- The lift station had a visual and sound alarm system. A float level was present which was in good condition. A RTU uplink with an antenna was also observed on site.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

3.13.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	N/A	High	**HIGH**
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	**HIGH**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO SHORELINE LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	**HIGH**
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
				Contingency (20%)	$ 1,000.00	
				Total Construction cost	**$ 6,000.00**	

3.14 STEWART LIFT STATION

3.14.1 INTRODUCTION

The Stewart lift station is located at 2820 Stewart Way, in the West WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, pumps, electrical and instrumentation panels. The lift station was originally constructed in 2006. It is a submersible type lift station and has two (2) pumps of 7 HP rating and 80 GPM pumping capacity each. The dry well has a dimension of 7 feet by 7 feet and a depth of 11.5 feet.

The condition assessment of the Stewart Lift Station was performed on December 18, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good with the perimeter fence, site grounds, pavement and drainage being in good condition.
- The wet well was in good condition with no significant deposition of debris, fat, oil and grease. An air compressor was installed on site for wet well aeration.
- The concrete valve vault was in good condition. It had a floor drain for drainage and a ventilation pipe. The coating on the valve vault was flaking at some locations.
- Two (2) 4 inch ductile iron check valves, two (2) 4 inch ductile iron discharge valves, 4 inch riser pipe, 4 inch discharge pipe and fittings all showed significant corrosion and were in poor condition.
- A NEMA4X electrical panel was present on site and was observed to be in good condition.
- The lift station had a visual and sound alarm system and float levels.
- An instrumentation panel was also observed on site with a RTU uplink and an antenna.
- While performing pump drawdown tests, it was observed that Pump 1 was pumping at much lower rate than Pump 2.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

3.14.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	N/A	High	**HIGH**
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	**HIGH**
3	Address check valve, riser pipe and fittings corrosion. Clean, seal/paint/coat.	Poor	Medium	**HIGH**
4	Line Wet Well for corrosion protection.	N/A	Medium	**MEDIUM**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST
RECOMMENDED IMPROVEMENTS TO STEWART LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT	TOTAL PRICE	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	**HIGH**
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
3	Address check valve, riser pipe and fittings clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	**HIGH**
4	Line Wet Well for corrosion protection	377	SF	$ 75.00	$ 29,000.00	**MEDIUM**
				Contingency (20%)	$ 7,300.00	
				Total Construction cost	**$ 43,800.00**	

3.15 UNIVERSITY PARK LIFT STATION

3.15.1 INTRODUCTION

The University Park lift station is located at 3996 Duchess Drive, in the West WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, pumps, electrical and instrumentation panels. It is a self-priming type lift station and has two (2) pumps of 10 HP rating and 87 GPM pumping capacity each. The dry well has a diameter of 6 feet and a depth of 10 feet.

The condition assessment of the University Park Lift Station was performed on December 14, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was poor. The wet well slab was observed to have openings near the top which allowed wet weather inflow into the wet well. A retaining wall made of railroad ties was observed and was broken in places. Additionally, the ground around the lift station perimeter was sloped towards wet well slab. This could lead to further erosion, I/I and surface drainage problems for the lift station site in the future.
- The driveway to the lift station was also in poor condition and the lighting on site was not operational.
- The wet well had significant debris deposit and the metal wet well slab cover was also in poor condition. The wet well walls had deteriorated due to exposure to corrosive environment.
- Two (2) 4 inch ductile iron check valves, one (1) 4 inch ductile iron discharge valve, riser pipe, discharge pipe and fittings were all observed to be in poor condition due to significant corrosion.
- Additionally, the check valve for pump 1 was not operational and the discharge pipe leaked into the wet well during and after pumping.
- Significant corrosion was also noticed on pump frames. Motors had grease accumulation on shaft.
- The electrical panel was not a NEMA4X and was in fair condition. At the fittings in the wet well, the PVC conduits were not connected and an open junction box was observed at the base of the service pole.
- The instrumentation panel was observed to be in poor condition. The ultrasonic float level was in fair condition with some amount of corrosion. No alarms were visible on site.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

3.15.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	N/A	High	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
3	Install Package Lift Station with 6 ft Diameter by 10 ft Depth Fiberglass Wet Well	N/A	Medium	MEDIUM
4	Install Strobe and Horn Alarm System	N/A	Medium	MEDIUM
5	Install NEMA4X Electrical and Instrumentation Panels	N/A	Medium	MEDIUM

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO UNIVERSITY PARK LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
3	Install Package Lift Station with 6 ft Diameter by 10 ft Depth Fiberglass Wet Well	1	LS	$ 100,000.00	$ 100,000.00	MEDIUM
4	Install Strobe and Horn Alarm System	1	LS	$ 1,000.00	$ 1,000.00	MEDIUM
5	Install NEMA4X Electrical and Instrumentation Panels	1	LS	$ 50,000.00	$ 50,000.00	MEDIUM
				Contingency (20%)	$ 31,200.00	
				Total Construction cost	**$ 187,200.00**	

4. Findings and Recommendations- South WWTP Basin Lift Stations

The South WWTP Basin has nine (9) lift stations. In this section, the condition assessment observations for all nine (9) South Basin lift stations are presented followed by prioritized list of recommendations for improvements and corresponding cost estimates.

It is to be noted that all recommendations are made with the intent of preventing the occurrence of SSOs. Back-up/emergency power procedures have been addressed in a separate Sanitary Sewer Overflow Response Plan prepared by TWU staff.

Additional information for each lift station including lift station location maps, condition assessment forms, on-site photographs and lift station plans and pump curves (if available) are presented in **Appendix A.**

4.1 BROOKS LIFT STATION

4.1.1 INTRODUCTION

The Brooks lift station is located at 92414 Quiet Water in the South WWTP service area. The lift station site consists of a wet well, valve vault, submersible pumps and electrical and instrumentation panels. It is a submersible type lift station and has two (2) pumps of 14 HP rating and 277 GPM (gallons per minute) pumping capacity each. The wet well has a dimension of 20.5 feet by 30.5 feet and a depth of 25 feet.

The condition assessment of the Brooks Lift Station was performed on December 12, 2017. The following are some general observations based on the condition assessment:

- The overall site appearance is fair. Some wood fence slats are broken or deflected at certain locations. Due to poor surface drainage, there is some erosion on site that undermines the perimeter fence.
- The wet well is in good condition with minor amount of debris and dirt deposit.
- Two (2) Ductile Iron (D.I.) discharge valves and Two (2) check valves were observed to have some amount of corrosion.
- The wet well also had discharge piping, riser piping and fittings, all of which had some corrosion, including the pump chains. Additionally, an air compressor was observed on site to provide aeration for the wet well.
- The electrical and instrumentation panels were in good condition. No visual or sound alarms were observed on site.
- The Electric Metal Tubing (EMT) was open on top of the electrical panel. This opening allows rainwater into the electric panel.
- An electrical quick connect provides backup service with a portable generator.

4.1.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
2	Rehab and Close electrical conduit on Top of Electric Panel to Avoid Rain Water Entering Panel	Poor	Medium	HIGH
3	Site Grading Along Southside Fence	Poor	Medium	HIGH
4	Reconnect Strobe Alarm System	N/A	Medium	MEDIUM

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST RECOMMENDED IMPROVEMENTS TO BROOKS LIFT STATION						
ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
2	Rehab and Close electrical conduit on Top of Electric Panel to Avoid Rain Water Entering Panel	1	LS	$ 1,000.00	$ 1,000.00	HIGH
3	Site Grading Along Southside Fence	1	LS	$ 10,000.00	$ 10,000.00	HIGH
4	Reconnect Strobe Alarm System	1	LS	$ 500.00	$ 500.00	MEDIUM
				Contingency (20%)	$ 2,300.00	
				Total Construction cost	**$ 13,800.00**	

4.2 CHARLESTON LIFT STATION

4.2.1 INTRODUCTION

The Charleston lift station is located at 2916 Savannah Creek, in the South WWTP basin of Tyler. The site consists of a wet well, valve vault, submersible pumps and electrical and instrumentation panels. The lift station is a submersible type and was originally constructed in 2000. The lift station has two (2) pumps of 12 HP rating and 130 GPM pumping capacity each. The wet well has a dimension of 7 feet by 8 feet and depth of 18 feet.

The condition assessment of the Charleston Lift Station was performed on December 14, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair. One side of both wet well and valve pit slabs were flush with existing ground allowing drainage on the slabs.
- At the time of the assessment, it was observed that the wet well slab shows some deterioration at the hatch opening. Additionally, all components in the valve vault had significant corrosion.
- The air compressor for the wet well was not plugged in.
- The two (2) ductile iron (D.I.) discharge valves and two (2) D.I. check valves were both in poor condition with significant corrosion on all valves, pipes and fittings. Additionally, one (1) discharge pipe was observed to have a pipe leak.
- No guiderails were observed for Pumps 1 & 2. Additionally, the pumps were too close to the floor causing operational difficulty.
- Minor corrosion was visible on the electrical panel door hinges.
- While performing pump drawdown tests, it was observed that Pump 1 was not in operation.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

4.2.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Check For Cause of Failure and Repair/ Replace Pump 1 (Submersible Type-12 HP, 130 GPM).	N/A	High	**HIGH**
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	**HIGH**
3	Inspect For Functionality and Replace 6" DI Check Valves (2)	Poor	Medium	**HIGH**
4	Address check valve, riser pipe and fittings corrosion. Clean and seal/paint.	Poor	Medium	**HIGH**
5	Install Cam Lock Quick Connect to Force Main for Portable Pump. (Cost includes valves, fittings, etc. required for connection)	Poor	Medium	**HIGH**

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO CHARLESTON LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Check For Cause of Failure and Repair/ Replace Pump 1 (Submersible Type-12 HP, 130 GPM)	1	EA	$ 25,000.00	$ 25,000.00	**HIGH**
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	**HIGH**
3	Inspect For Functionality and Replace 6" DI Check Valves (2)	2	EA	$ 5,000.00	$ 10,000.00	**HIGH**
4	Address check valve, riser pipe and fittings clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	**HIGH**
5	Install Cam Lock Quick Connect to Force Main for Portable Pump. (Cost includes valves, fittings, etc. required for connection)	1	LS	$ 5,000.00	$ 5,000.00	**HIGH**
				Contingency (20%)	$ 8,500.00	
				Total Construction cost	**$ 51,000.00**	

4.3 CROSSING LIFT STATION

4.3.1 INTRODUCTION

The Crossing lift station is located at 7761 Cross Road, in the South WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, and electrical and instrumentation panels. The lift station is a submersible type and has two (2) pumps of 20 HP rating and 312 GPM pumping capacity each. The wet well has a dimension of 8 feet by 8 feet and depth of 14 feet. The City of Tyler recently constructed the Oak Creek lift station in the South WWTP basin. The Oak Creek lift station has been in operation since April 2017 and is to eventually replace the Crossing lift station.

The condition assessment of the Crossing Lift Station was performed on December 12, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair.
- The driveway to the lift station was in poor condition. Additionally, on site lighting needs maintenance.
- At the time of the assessment, it was observed that the wet well contained significant amount of debris, fats, oil and grease. Additionally, the wet well walls had pitting along the water line.
- Wet well fittings and riser piping were observed to be in poor condition with corrosion on riser pipes. The valve vault and check valves were in good condition.
- Electrical quick connect plug is installed for use with portable generator during power outage.

4.3.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

The condition assessment of The Crossing lift station identified several deficiencies in the lift station. However, since this lift station is soon to be replaced by the Oak Creek lift station, no improvements are recommended for this lift station.

4.4 EAST GRANDE LIFT STATION

4.4.1 INTRODUCTION

The East Grande lift station is located 13692 Sydney Road, in the South WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, and electrical and instrumentation panels. The lift station is a submersible type and was originally constructed in 2015 and has two (2) pumps of 35 HP rating and 500 GPM pumping capacity each. The wet well has a dimension of 12 feet by 12 feet and depth of 18 feet.

The condition assessment of the East Grande Lift Station was performed on December 15, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was fair. Some edges of the wet well slab were flush with natural ground.
- The air compressor for the wet well was not operational.
- The wet well hatch was observed with minor corrosion on the top surface.
- The floor drain for the valve vault needs cleaning.
- The two (2) ductile iron (D.I.) discharge valves and two (2) D.I. check valves were in good condition. Additionally, one (1) pump has a lift cable attached; the second pump cable was found coiled on the instrument panel post.
- Air compressor for aeration of wet well was observed above ground near electrical and instrumentation panels in good condition.
- Electrical quick connect plug is installed for use with portable generator during power outage.

4.4.2 RECOMMENDATIONS FOR IMPROVEMENT

The lift station was in fair condition overall and no major problems were noted on site which might contribute to SSOs in the future.

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH

4.5 FAULKNER LIFT STATION

4.5.1 INTRODUCTION

The Faulkner lift station is located 460 West Cumberland Road, in the South WWTP basin of Tyler. The lift station site consists of an Environmental One Fiberglass Package System and an Environmental One Electrical Panel. The lift station was originally constructed in 2002 and has two (2) pumps of 1 HP rating and 10 GPM pumping capacity each. The wet well has a dimension of 12 feet by 12 feet and depth of 18 feet.

The condition assessment of the Faulkner Lift Station was performed on December 15, 2017. Due to its enclosed design, several major lift station components could not be observed for the purpose of the condition assessment. However, based on the input from TWU staff, the lift station is in good operational condition. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good.
- Fluids, piping, valves and fittings could not be observed in the wet well due to system design.
- No pump performance tests were conducted at the lift station since no access was available to perform the tests due to design.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

4.5.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

The condition assessment of the Faulkner lift station identified that there was no backup electrical generator on site. However, since this lift station is a relatively small lift station (10 GPM); no improvements are recommended for this lift station apart from regular maintenance and inspections.

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH

4.6 GILLEY CREEK LIFT STATION

4.6.1 INTRODUCTION

The Gilley Creek lift station is located at 9127 County Road 2120, in the South WWTP basin of Tyler. The lift station was constructed in 1975 and it consists of a brick building, wet well, pumps, electrical and instrumentation panel. It is a self-priming type lift station and has six (6) pumps- three (3) sets of two (2) pumps each (One (1) Cornell Pump and one (1) Gorman-Rupp Pump) which are operated in series. The pumps have an individual pumping capacity of 2200 GPM. The lift station also has provisions for a future fourth set of pumps. The wet well has a dimension of 32 feet by 32 feet and a depth of 18.50 feet.

The condition assessment of the Gilley Creek Lift Station was performed on December 14, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good. The building structure was in good condition. A glass panel was missing from the lower half of a window on the West side of the building.
- Topography and surrounding grading allowed water to enter the building and also caused damage to the concrete driveway. The North side of the building is adjacent to a steep slope and no flood or erosion control measures were observed.
- Chain link fence and gate showed some corrosion but were in fair condition.
- The wet well was in good condition. The hatch door could not be opened easily without the use of tools. There was limited wet well visibility and the condition of the wet well walls was not noted.
- The following mechanical components were observed to be in poor condition due to corrosion:
    - Four (4) 12 inch ductile iron check valves
    - Four (4) 12 inch ductile iron discharge valves
    - One (1) 6 inch ductile iron discharge valve
- The riser pipe was in good condition above the slab but showed some amount of corrosion below the slab and was in fair condition. Corrosion was also observed on the 18 inch discharge manifold and the pump frames.
- The lift station did not have a NEMA4X electric panel. Triplex transducer controls are needed at the site and the phase monitors are in poor condition.
- Force main Cam Lock connector provides portable pump quick connection during electrical or mechanical failures.
- No visual or audible alarms were observed. An ultrasonic flowmeter, RTU uplink and antenna were present on site and were in good condition.

4.6.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Provide Flood Protection Wall Around Lift Station Perimeter(70' L x 4' H x 8" T) (or convert to Submersible type lift station)	Poor	High	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
2	Install Strobe and Horn Alarm System	N/A	Medium	MEDIUM
3	Install NEMA4X electric panel on site with phase monitors and triplex transducer controls	N/A	Medium	MEDIUM
4	Investigate source of excessive noise.	N/A	Medium	MEDIUM

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST
RECOMMENDED IMPROVEMENTS TO GILLEY CREEK LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Provide Flood Protection Wall Around Lift Station Perimeter(70' L x 4' H x 8" T) (or convert to Submersible type lift station)	1	LS	$ 50,000.00	$ 50,000.00	HIGH
2	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
3	Install Strobe and Horn Alarm System	1	LS	$ 1,000.00	$ 1,000.00	MEDIUM
4	Install NEMA4X electric panel on site with phase monitors and triplex transducer controls	1	LS	$ 50,000.00	$ 50,000.00	MEDIUM
5	Investigate source of excessive noise.	1	LS	$ 1,000.00	$ 1,000.00	MEDIUM
				Contingency (20%)	$ 20,400.00	
				Total Construction Cost	**$ 122,400.00**	

4.7 HAMPTONS LIFT STATION

4.7.1 INTRODUCTION

The Hamptons lift station is located at 4274 Old Omen Road, in the South WWTP basin of Tyler. The lift station site consists of a wet well, dry vault, and electrical and instrumentation panels. The lift station was constructed in 2005. It is a submersible type lift station and has two (2) pumps of 10 HP rating and 354 GPM pumping capacity each. The wet well has a diameter of 6 feet and a depth of 30 feet.

The condition assessment of the Hamptons Lift Station was performed on December 16, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good. The lift station grounds and driveway were in good condition but poor surface drainage and erosion had undermined the fence post on the East side of the lift station.
- The wet well had some debris and fat, oil and grease deposits. The wall coating was flaking in multiple locations and was in poor condition. An air compressor was present on site for wet well aeration.
- The dry vault made of concrete had some coating flaking as well. The floor drain of the vault needed cleaning and some corrosion was observed on the ventilation pipe.
- The two (2) 6 inch ductile iron check valves and the two (2) 6 inch ductile iron discharge valves showed signs of corrosion.
- The electric panel itself was in good condition. However, the panel currently faces the fence allowing for very limited access.
- The level floats and visual alarm on site were in fair condition.
- An RTU uplink and antenna were also observed.
- While performing pump drawdown tests, it was observed that while both Pumps were functioning well individually, the dual pump operation was not functional.
- During lift station outages TWU staff pumps and transport wastewater utilizing jet-vac truck(s).

4.7.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
2	Address check valve, riser pipe and fittings corrosion. Clean and seal/paint	Poor	Medium	HIGH
3	Investigate duplex operation control	N/A	Medium	MEDIUM
4	Install Force Main Cam Lock for use with backup pumps	N/A	Medium	MEDIUM
5	Reorient Electric Panel Away From Fence To Allow Access For Maintanance	Fair	Low	LOW

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS TO HAMPTONS LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	LS	$ -	$ -	HIGH
2	Address check valve, riser pipe and fittings clean and seal/paint	1	LS	$ 2,500.00	$ 2,500.00	HIGH
3	Investigate duplex operation control	1	LS	$ 1,500.00	$ 1,500.00	MEDIUM
4	Install Force Main Cam Lock for use with backup pumps	1	LS	$ 5,000.00	$ 5,000.00	MEDIUM
5	Reorient Electric Panel Away From Fence To Allow Access For Maintanance	1	LS	$ 25,000.00	$ 25,000.00	LOW
				Contingency (20%)	$ 6,800.00	
				Total Construction cost	**$ 40,800.00**	

4.8 OAK CREEK LIFT STATION

4.8.1 INTRODUCTION

The Oak Creek lift station is located at Oak Creek Blvd., in the South WWTP basin of Tyler. The lift station site consists of a wet well, valve vault, an air compressor and electrical and instrumentation panels. The lift station is a submersible type lift station. It was recently constructed and has been operational since April 2017. It has two (2) submersible pumps and a wet well. The wet well has a dimension of 10 feet by 10 feet and a depth of 20 feet.

The condition assessment of the Oak Creek Lift Station was performed on December 18, 2017. The following are some observations based on the condition assessment:

- The Oak Creek lift station is fairly new and was in overall good condition.
- The overall site appearance of the lift station was good. No problems were noted with respect to the lift station ground or perimeter fence and the slab was constructed above natural ground level.
- The wet well and the valve vault were in good condition with no significant corrosion or debris deposit. There was a crane in place at the wet well for pump maintenance and it was in good condition. An air compressor was also present for wet well aeration.
- The two (2) check valves and the two (2) discharge valves were also in good condition. The riser pipe, discharge pipe and fittings also showed no signs of corrosion and were in good condition.
- A NEMA4X electric panel was present on site along with a natural gas operated backup generator.
- The instrumentation panel was in good condition and contained the RTU uplink and antenna.
- An Ultrasonic float level was also observed and the lift station was equipped with a visual alarm system.
- No pump drawdown tests were performed at this lift station since the lift station is new and has insufficient flows to perform testing.

4.8.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

Due to the lift station being new and in operation for less than a year, the condition was noted to be good and no improvements are recommended for this lift station apart from regularly scheduled inspections and maintenance activities.

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH

4.9 SHACKLEFORD CREEK LIFT STATION

4.9.1 INTRODUCTION

The Shackleford Creek lift station is located at 9125 Cherokee Trail, in the South WWTP basin of Tyler. The lift station site consists of a CMU building, wet well, pumps and mechanical components, electrical and instrumentation panels and an electric generator. The lift station is a submersible type and was constructed in 1987. It has two (2) pumps of 107 HP rating and 500 GPM pumping capacity each. The wet well has a dimension of 25 feet by 16 feet and a depth of 21 feet.

The condition assessment of the Shackleford Creek Lift Station was performed on December 12, 2017. The following are some observations based on the condition assessment:

- The overall site appearance of the lift station was good.
- Some cracks were observed in the CMU building wall. Additionally, unsealed wall footing at slab and improper surface drainage allow water and silt into the building from the West side.
- The wet well was observed to be in critical condition with a significant amount of debris, oil, grease and fat deposits. The wet well concrete walls were in good condition and an aerator was observed on site for wet well aeration.
- The two (2) 4 inch check valves and the two (2) 4 inch discharge valves were observed to be in good condition. The 4 inch riser pipe was in good condition above the slab but was significantly corroded beneath the slab.
- A flow meter and surge valve were also observed on the discharge pipe. These were in good condition.
- The electrical panel inside the building was in poor condition. Moisture and soil seepage from the exterior of the building had led to significant amount of corrosion at the base of the panel. The breaker and the generator control panel also showed significant corrosion. The speed control/VFD was not operational due to moisture build up.
- A level float was also observed on site and was in poor condition.
- An instrumentation panel with an RTU uplink and antenna was observed on site and was in good condition.
- Both a backup generator and force main cam lock connection are installed for outages.

4.9.2 RECOMMENDATIONS AND COST ESTIMATES FOR IMPROVEMENT

ITEM	RECOMMENDATION	CONDITION	CRITICALITY	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	N/A	High	HIGH
2	Address corrosion/moisture Existing Electrical Panel (first floor)	Poor	Medium	HIGH
3	Address check valve, riser pipe and fittings corrosion. Clean and seal/paint.	Poor	Medium	HIGH
4	Curtain Wall Grout Foundation and Building Wall on Westside	N/A	Medium	MEDIUM
5	Replace Level Float	Poor	Low	MEDIUM

PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST

RECOMMENDED IMPROVEMENTS SHACKLEFORD CREEK LIFT STATION

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	TOTAL PRICE	PRIORITY
1	Add wet well inspection to daily inspection log. Prepare work order to clean wet well as needed.	1	EA	$ -	$ -	HIGH
2	Address corrosion/moisture Existing Electrical Panel (first floor)	1	LS	$ 35,000.00	$ 35,000.00	HIGH
3	Address check valve, riser pipe and fittings corrosion. Clean and seal/paint.	1	LS	$ 2,500.00	$ 2,500.00	HIGH
4	Curtain Wall Grout Foundation and Building Wall on Westside	1	LS	$ 10,000.00	$ 10,000.00	MEDIUM
5	Replace Level Float	1	EA	$ 1,000.00	$ 1,000.00	MEDIUM
				Contingency (20%)	$ 9,700.00	
				Total Construction cost	**$ 58,200.00**	

5. Lift Station Improvement Plan

The condition assessment of the 24 lift stations in Tyler was performed and the findings of the assessment are presented in Section 3 and Section 4. Based on the results of the assessments and input from TWU Staff, a list of improvements was developed for each lift station. These improvements were identified to primarily assist in avoiding the occurrence of Sanitary Sewer Overflows (SSOs). In general the following major components and areas were identified for improvements:

- *Site grading and I/I reduction Measures*: To help provide proper surface drainage and reduce wet weather inflow into the wet well.

- *Wet Well Improvements*: Measures such as cleaning debris, fat, oil and grease deposits from wet wells along with structural improvements where necessary were recommended to ensure that the wet well functions is structurally stable and functions to optimum capacity.

- *Mechanical Components*: Pipes, valve, fittings, etc. that were in poor condition or inoperative were recommended to be repaired or replaced.

- *Electrical Requirements*: Condition of existing electrical panels was assessed and necessary upgrades were suggested. TWU staff prepared a Sanitary Sewer Overflow Response Plan that addresses procedures TWU utilizes during lift station outages. Standby generators, electrical quick connect switches (for use with portable generator), Cam Lock quick connects on force main (for use with portable pumps) and use of jet-vac to pump and haul wastewater are available to address electrical or mechanical failures at lift stations.

- *Lift Station Alarm Systems*: Improvements were suggested to ensure properly functioning alarm systems are present at all lift stations to provide operators with sufficient response time in case high water levels and potential SSOs are anticipated.

- *Operation and Maintenance*: Improvements to safety, site lighting, accessibility, etc. were suggested to provide favorable conditions for operators to perform maintenance and/ or emergency repairs if needed.

For each lift station, all recommendations are prioritized as high, medium or low based on their condition and criticality as per **Table 5-1**.

Table 5-1: Criteria for Priority Assignment

CRITICALITY	CONDITION		
	Good	Fair	Poor
Low	Low Priority	Low Priority	Low Priority
Medium	Low Priority	Medium Priority	High Priority
High	Low Priority	Medium Priority	High Priority

The Lift Station Improvement Plan is presented in **Table 5-2**. Each recommended improvement is presented with an associated cost and assigned priority. These cost estimates were developed using cost information from similar previous projects and budget level quotes from vendors. The costs presented include both cost of material and labor and are based on 2018 estimates. A 20% contingency is included while calculating the cost for each individual lift station to account for allowances for unidentified key project elements and increase in market prices over time.

All recommended improvements listed under the Lift Station Implementation Plan are to be completed within five (5) years of the effective date (April 10, 2017) of the Consent Decree. The Annual Report to EPA/TCEQ will summarize the status of these projects. The implementation schedule is presented in **Table 5-2**.

The results of the hydraulic modeling capacity assessment may impact individual lift station condition remedial measures projects. For example, a project to address a lift station structural issue may be deferred if the hydraulic model identifies that the lift station may be abandoned or significantly upsized as a result of capacity improvements. As a result, changes may be necessary to the Lift Station Improvement Plan based on the hydraulic modeling capacity assessment results.

Table 5-2: Lift Station Improvement Plan Schedule

Item	Lift Station Name	Address	Asset ID	Completion Schedule			
				Apr-19	Apr-20	Apr-21	Apr-22
1	Animal Shelter	1847 C R 386	SS.LS.T0000003		■		
2	Bellwood	10362 C R 1138	SS.LS.T0000007				■
3	Brooks	92414 QUIET WATER	SS.LS.T0000018		■		
4	Charleston	2916 SAVANNAH CRK	SS.LS.T0000002				■
5	CR 46	15750 C R 46	SS.LS.T0000013	■			
6	Crossing	7761 CROSS RD	SS.LS.T0000012	None Required			
7	Dixie	168 EISENHOWER DR	SS.LS.T0000025				■
8	East Grande	13692 SYDNEY RD	SS.LS.T0000042	None Required			
9	Faulkner	460 W CUMBERLAND RD	SS.LS.T0000023	None Required			
10	Gilley Creek	9127 C R 2120	SS.LS.T0000005				■
11	Greenbriar	10936 SPUR 164	SS.LS.T0000006	■			
12	Hamptons	4274 OLD OMEN RD	SS.LS.T0000019			■	
13	Haverhill	3970 C R 219	SS.LS.T0000001		■		
14	Highway 31 W	13933 STATE HWY 31 WEST	SS.LS.T0000043	■			
15	Highway 69 N	12808 HWY 69 N	SS.LS.T0000014	None Required			
16	Hogan	3984 HOGAN DR	SS.LS.T0000020	■			
17	Nottingham	9799 C R 274	SS.LS.T0000011			■	
18	Oak Creek	2551 Oak Creek Blvd	SS.LS.T0000044	None Required			
19	Pilot	12292 FM 14	SS.LS.T0000024			■	
20	Rustic	3284 N NORTHEAST LOOP 323	SS.LS.T0000004				■
21	Shackleford	9125 CHEROKEE TRL	SS.LS.T0000010				■
22	Shoreline	4588 CASCADE SHORELINE DR	SS.LS.T0000021	■			
23	Stewart	11948 GREENBRIAR LAKE RD	SS.LS.T0000022			■	
24	University Park	3996 DUCHESS DR	SS.LS.T0000008				■