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## A. Technical Memorandum

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**To:** Steve Olson, District Manager, Industrial park Water and Sanitation District  
**From:** Xuehua Bai, PE  
**Date:** August 22, 2019  
**Subject:** Tech Memo for METRO Wastewater Discharge Payment Model

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### Section 1 Purpose

The purposes of this technical memorandum are briefly outlined as:

- To evaluate the wastewater discharge payment method used by Metro Wastewater Reclamation District (METRO).
- To develop a wastewater discharge payment model applied to Industrial Park Water and Sanitation District (District).
- Based on the wastewater discharge payment model (Payment Model), to predict the District's wastewater discharge payments for the pilot water quality improvement project that is currently performed at Ivy Lift Station. Five water quality data were collected. They are the BOD, TSS, and TKN data collected on March 21, 2019, May 10, 2019, May 15, 2019, May 21, 2019, and August 7, 2019.
- To determine if the Pilot water quality program is recommended to the District-wide application.

### Section 2 Wastewater Discharge Payment

The amounts wastewater discharge payments to the District are keep rising as shown in Table 1. The payment is calculated based on five wastewater qualities, including wastewater flow (Flow), biological oxygen demand (BOD), suspended solids (SS), Total Kjeldahl Nitrogen (TKN), and Metering and Sampling (CECU). METRO determines a unit charge for each parameter each year. The breakdown of the unit charge from METRO is also shown below in Table 1.

**Table 1. METRO Wastewater Parameters Unit Charge**

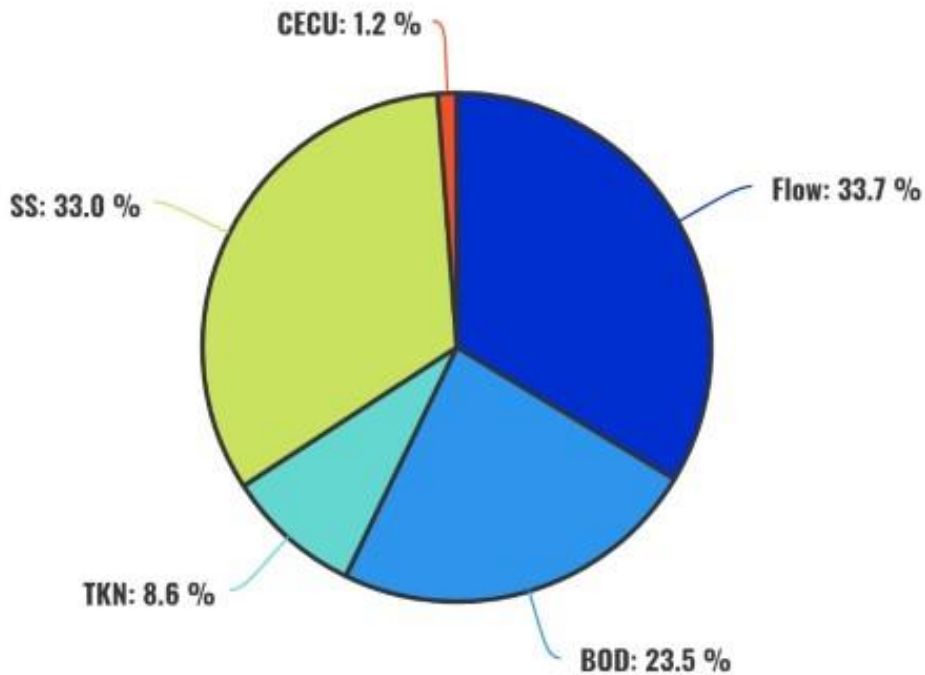
<b>Parameters</b>	<b>2018 Unit Charge</b>	<b>2019 Unit Charge</b>	<b>Unit</b>
Wastewater Flow	880.93	908.52	\$/MG
BOD	558.19	576.44	\$/Ton
SS	772.78	806.48	\$/Ton
TKN	1176.78	1173.36	\$/Ton
CECU	27004.00	28292.00	\$/CECU

### Section 3 METRO 2019 Wastewater Payment Formula

The District's 2019 wastewater discharge payment provided by METRO is provided in Figure 1 and Appendix A.

Flow (MG)	BOD (Tons)	SS (Tons)	TKN (Tons)	CECU
30.24	65.29	41.95	9.70	0.52

### COST COMPONENTS PERCENT ALLOCATIONS



### 2019 NET ANNUAL CHARGE

**\$127,878**

Figure 1. District 2019 Wastewater Discharge Payment Posted by METRO

In summary, the wastewater discharge payment can be estimated by the following equation:

$$\begin{aligned}
 \$\$ = & \text{Total Flow} * \text{Flow Unit Charge} + \text{BOD}_{\text{tot.}} * \text{BOD Unit Charge} + \text{SS}_{\text{tot.}} * \text{SS Unit Charge} \\
 & + \text{TKN}_{\text{tot.}} * \text{TKN Unit Charge} + \text{CECU} * \text{CECU Unit Charge}
 \end{aligned}$$

## Section 4 METRO Wastewater Payment Model

Bai Engineers (BE) developed an excel spreadsheet model to predict the wastewater discharge payment for 2019 and future scenarios.

### 4.1 2019 Metro Payment Model

Using the total wastewater parameters provided in Figure 1, the District's wastewater discharge payment modeled and summarized in Table 2.

**Table 2. District 2019 Wastewater Discharge Payment Model Results**

Parameters	Total	Unit	Cost
Wastewater Flow	30.24	MG	\$ 27,473.64
BOD	65.29	Ton	\$ 37,635.77
SS	41.95	Ton	\$ 33,831.84
TKN	9.70	Ton	\$ 11,381.59
CECU	0.52	CECU	\$ 14,711.84
		Total	<u>\$125,034.68</u>

The difference between METRO's actual payment value (\$127,878) and BE's modeled payment value (\$125,035) is \$2,843 or 2.2%. The difference may be due to rounding by METRO. (i.e. the total wastewater flow is rounded to two significant digits of 908.52 MG).

### 4.2 Recommendation

It is recommended the spreadsheet wastewater discharge payment model can be used for future payment scenario analysis.

## Section 5 Pilot Water Quality Improvement

The District conducted a pilot water quality improvement at Ivy Lift Station since June 19, 2019. The pilot water quality improvement project included:

- Installation of the Bug-on-a-rope since June 19, 2019, and
- Installation of the Liquid GreaseZilla since June 26, 2019.

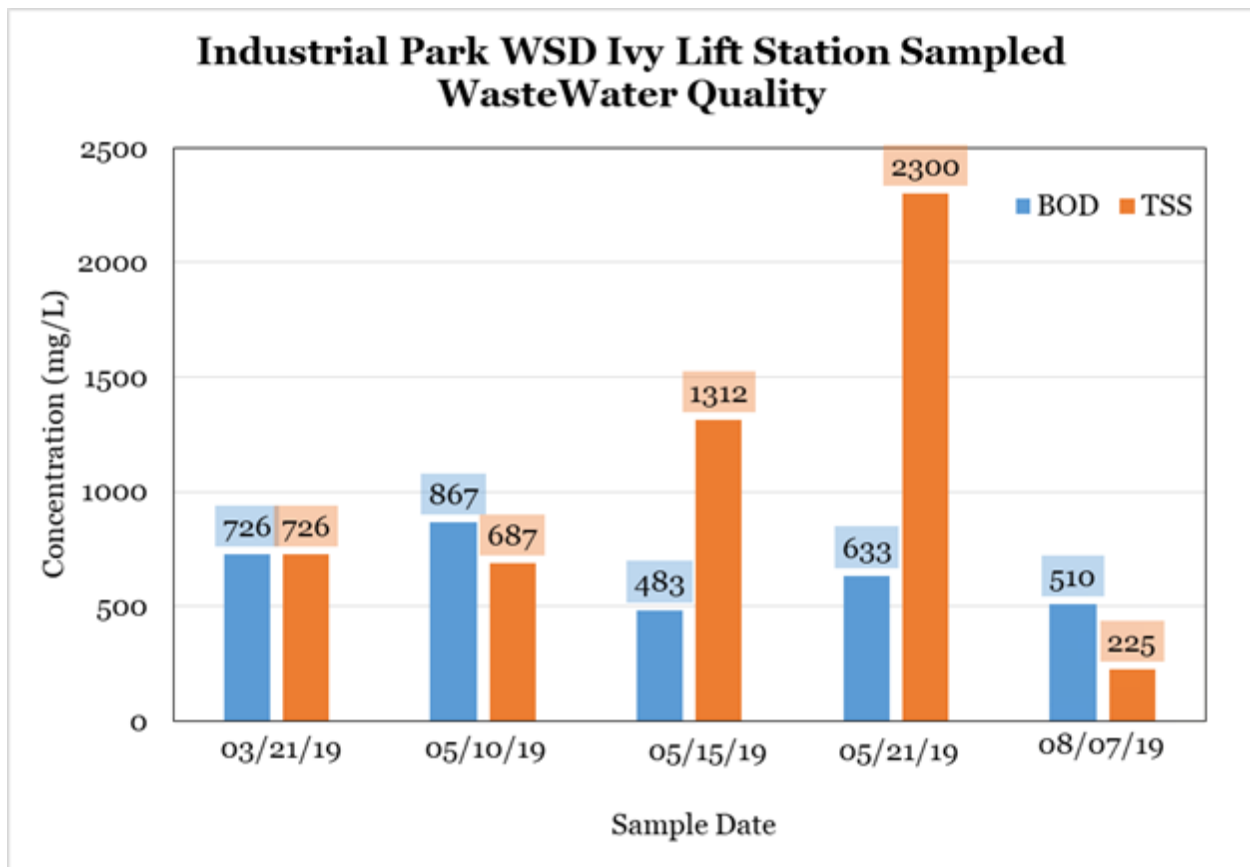
Detail information and data sheets about the Bug-on-a-rope and the Liquid GreaseZilla are provided in Appendix B.

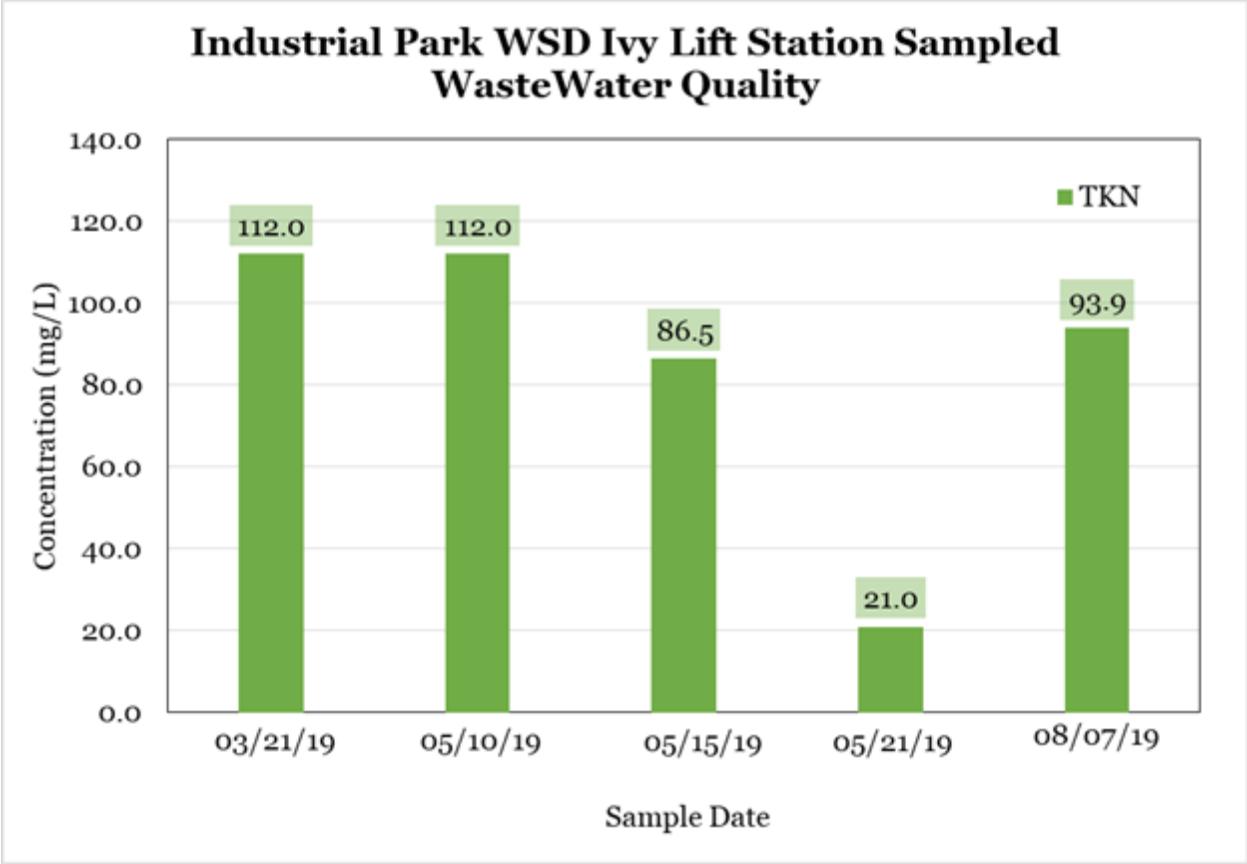
Five wastewater water samples were taken and analyzed. The water sample parameters are documented in Table 3 and Figure 2. Copies of the water quality data are provided in Appendix C.

**Table 3. Pilot Water Quality Improvement Project: Water Quality Data**

Date	Sampled Water Quality (mg/L)		
	BOD	TSS	TKN
3/21/2019	726	726	112.0
5/10/2019	867	687	112.0
05/15/2019	483	1312	86.5
05/21/2019	663	2300	21.0
8/7/2019	510	225	93.9
2019 Value Provided by METRO <sup>1</sup>	525	335	77.4

*Note: 1. Values are provided by METRO along with the 2019 cost estimate.*





**Figure 2. Pilot Water Quality Improvement Project Data**

As shown in Figure 2, the sample analyzed on May 15, 2019 and May 21, 2019 were identified as outlier due to the unreasonable low TKN and high TSS values. These two samples were excluded for this analysis.

**Section 6 Predicted METRO Payment per Pilot Water Quality Improvement Project Data**

Based on the METRO Payment Model identified in Section 3 and water quality data obtained from the Pilot Water Quality Improvement Project, a number of predicted METRO payments are summarized in Tables 4 through 6.

**Table 4. Predicted METRO Payment per March 21, 2019 Water Quality Data**

<b>Parameters</b>	<b>Sampled Quality</b>	<b>Unit</b>	<b>Total</b>	<b>Unit</b>	<b>Cost</b>
Wastewater Flow	30.24	MG	30.24	MG	\$27,473.64
BOD	726	mg/L	91.61	Ton	\$52,806.64
SS	726	mg/L	91.61	Ton	\$73,880.20
TKN	112.0	mg/L	14.13	Ton	\$16,582.39
CECU	0.52	CECU	0.52	CECU	\$14,711.84
				<b>Total</b>	<b><u>\$185,454.72</u></b>

**Table 5. Predicted METRO Payment per May 10, 2019 Water Quality Data**

<b>Parameters</b>	<b>Sampled Quality</b>	<b>Unit</b>	<b>Total</b>	<b>Unit</b>	<b>Cost</b>
Wastewater Flow	30.24	MG	30.24	MG	\$27,473.64
BOD	867	mg/L	109.40	Ton	\$63,062.48
SS	687	mg/L	86.69	Ton	\$69,911.43
TKN	112.0	mg/L	14.13	Ton	\$16,582.39
CECU	0.52	CECU	0.52	CECU	\$14,711.84
				<b>Total</b>	<b><u>\$191,741.78</u></b>

**Table 6. Predicted METRO Payment per August 7, 2019 Water Quality Data**

<b>Parameters</b>	<b>Sampled Quality</b>	<b>Unit</b>	<b>Total</b>	<b>Unit</b>	<b>Cost</b>
Wastewater Flow	30.24	MG	30.24	MG	\$ 27,473.64
BOD	510	mg/L	64.35	Ton	\$37,095.58
SS	225	mg/L	28.39	Ton	\$22,896.76
TKN	93.9	mg/L	11.85	Ton	\$13,902.56
CECU	0.52	CECU	0.52	CECU	\$14,711.84
				<b>Total</b>	<b><u>\$116,080.37</u></b>

The summary of comparison is documented in Table 7.

**Table 7. Comparison of BE's Estimate and METRO Values**

Date	Water Quality Parameters (mg/L)			Total Cost	Difference (BE's Estimate - METRO Values)
	BOD	TSS	TKN		
3/21/2019	726	726	112.0	\$185,454.72	45%
5/10/2019	867	687	112.0	\$191,741.78	50%
8/7/2019	510	225	93.9	\$116,080.37	-9%
Provided by METRO	525	335	77.4	\$127,878.00	

**Section 7 Coordination with METRO**

The District is currently working with METRO on the check and verification of the flow and sewer loads data provided (Appendix D). The comparison results are provided in Table 8.

**Table 8 Comparison of Flow and Load Data between METRO and the District**

Sample Date/Period	METRO			District
	Lowest	Average	Highest	
	03/28/2019 – 04/03/2019 <sup>1</sup>			03/21/2019
<b>BOD (mg/L)</b>	371	560	1020	726
<b>TSS (mg/L)</b>	192	345	537	726
<b>TKN (mg/L)</b>	35.6	86.9	105	112

*Note: 1. METRO conducted seven samples during this period, the lowest, average, and highest sample values during this period was documented.*

It is highly recommend the District to implement the water quality improvement project to other lift stations.

Xuehua Bai, PE

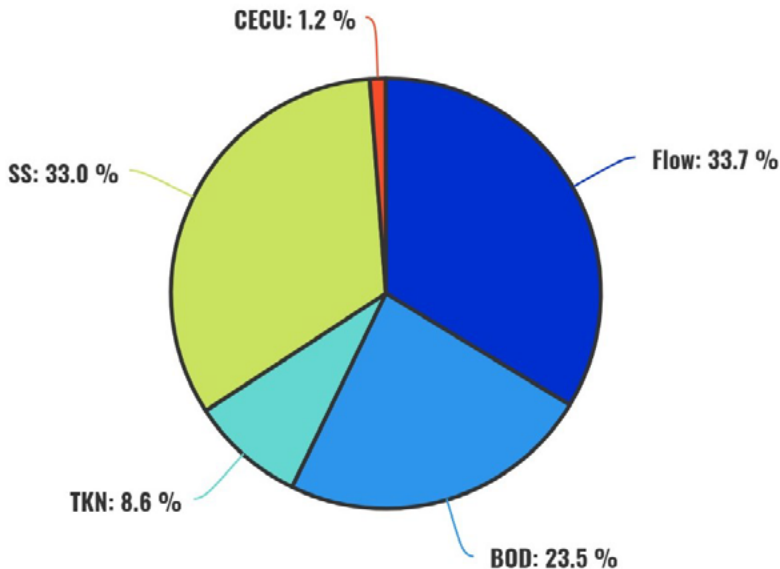
# 2019 METRO DISTRICT CHARGES INDUSTRIAL PARK

## ANNUAL CHARGES FOR SERVICE

### 2019 PROJECTED CONTRIBUTIONS

Flow (MG)	BOD (Tons)	SS (Tons)	TKN (Tons)	CECU
30.24	65.29	41.95	9.70	0.52

### COST COMPONENTS PERCENT ALLOCATIONS



### 2019 NET ANNUAL CHARGE

# \$127,878

## CONTACT AQUAFIX

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## SEWER CONNECTION CHARGES

# \$4,270

PER SINGLE FAMILY  
RESIDENTIAL  
EQUIVALENT (SFRE)

# \$130

REACTIVATION CHARGE

Water Tap Size Inches	SFREs	Price
.75	2	\$8,540
1	4.8	\$20,496
1.5	11	\$46,970
2	20	\$85,400
3	43	\$183,610
4	86	\$367,220
6 or Larger	Formula	See Section 7 of the Metro District's Rules and Regulations

## PAYMENT DUE DATES

Annual Charges	Sewer Connection Charges and Report
March 15	April 15
June 15	July 15
September 15	October 15
December 15	January 15