

Project Name | Sand Lake Iron Enhanced Sand Filter

Date | 11/1/2017

To | Jim Shaver, District Administrator

Cc |

From | Carl Almer & Mike Majeski

Regarding | IESF Performance Summary

Background

The following memo summarizes the results of the Sand Lake Iron Enhanced Sand Filter (IESF) for the 2017 monitoring season. The information provided in this memo is intended to provide a general indication of system performance during the first year of operation (and testing) and provides a basis for easement compensation to the underlying landowners of the Sand Lake IESF.

Results

Monitoring of the Sand Lake IESF began on April 25, 2017 with the installation of Isco automatic water quality samplers in two locations. One Isco was installed in the ditch immediately upstream of the IESF filter and one Isco was installed in the outlet manhole of the IESF filter. These locations were selected to determine pre- and post-IESF total phosphorus, dissolved phosphorus, and suspended sediment concentrations and total flows through the system. Surface water runoff discharged through the IESF filter from April 25 to July 22. After July 22, no water flowed through the IESF due to low flow in the ditch upstream of the IESF, as measured at the Inlet location.

Table 1 summarizes the performance of the IESF based on Flux analysis of water quality samples and calculated flow rates. Table 2 includes a summary of watershed loading and phosphorus removal by the IESF filter.

Table 1. Sand Lake IESF 2017 Total Phosphorus Performance Summary

Total IESF Discharge (CF)	TP Load to IESF (Lbs)	TP Load out of IESF (Lbs)	Total TP Removed (Lbs)	% TP Removal	Flow Weighted Mean TP of Discharge Flow (ppb)
1,241,862	39.4	3.1	36.3	92	37

Table 2. Annual Watershed Load

Total Watershed Discharge (CF)	Watershed TP Load (Lbs)	Total IESF TP Removed (Lbs)	% TP Removal
3,769,371	107.7	36.3	34

Discussion

Year 1 operation of the Sand Lake IESF performed as expected, given operational adjustments by many and the significant peak flows in spring followed by limited to no flows in the ditch system mid-summer through fall. Annual load reduction is within expectations. Based on the Flux analysis of the water quality discharged from the IESF filter, the average concentration of total phosphorus from the IESF during the monitoring season was 37 parts per billion (ppb). This value is below the in-lake concentration goal for Sand Lake set by the Sand Lake Diagnostic Study.

However, nearly two-thirds of the total watershed load bypassed the IESF due to peak flow rates in the ditch that bypassed the IESF, in part due to operational testing and the flow capacity of the IESF system. If peak flow rates in the ditch upstream of the IESF could be attenuated such that peak flows can be reduced from 5 cfs to 1-2 cfs, a significant increase in the overall treatment of the watershed load would be realized within the IESF. Attenuation of peak flows has been on the District's radar and renewed landowner outreach efforts are recommended to pursue control structures at the 2 immediate upstream road crossings (197th St. N and Ostrum Ave. N).

Based on our understanding of the easement agreement with the landowner, the 2017 annual payment should be \$30/Lb TP (36.3 Lbs) or \$1,089.

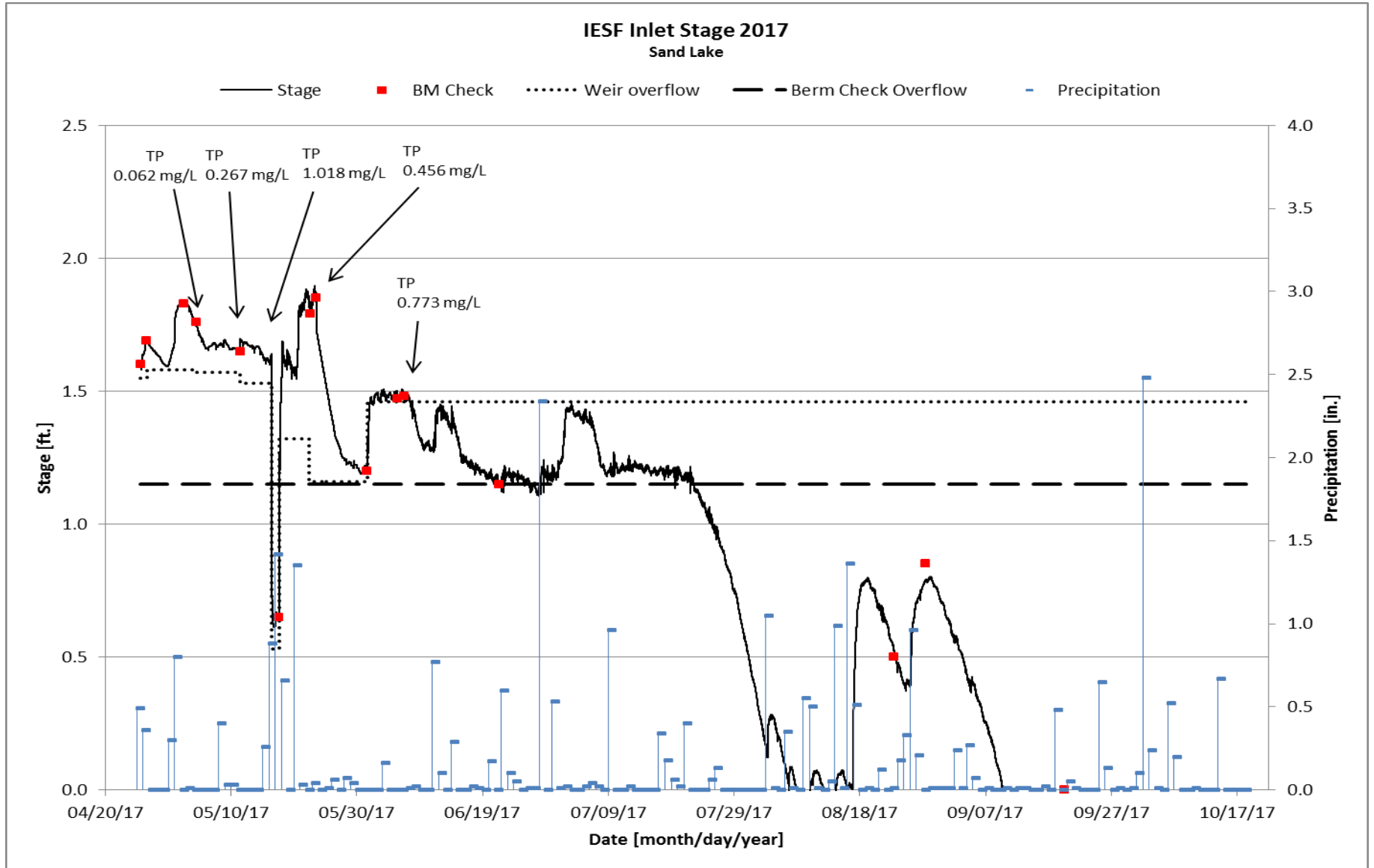


Figure 1. IESF Inlet Stage