



Iron Enhanced Sand Filter Performance and O&M

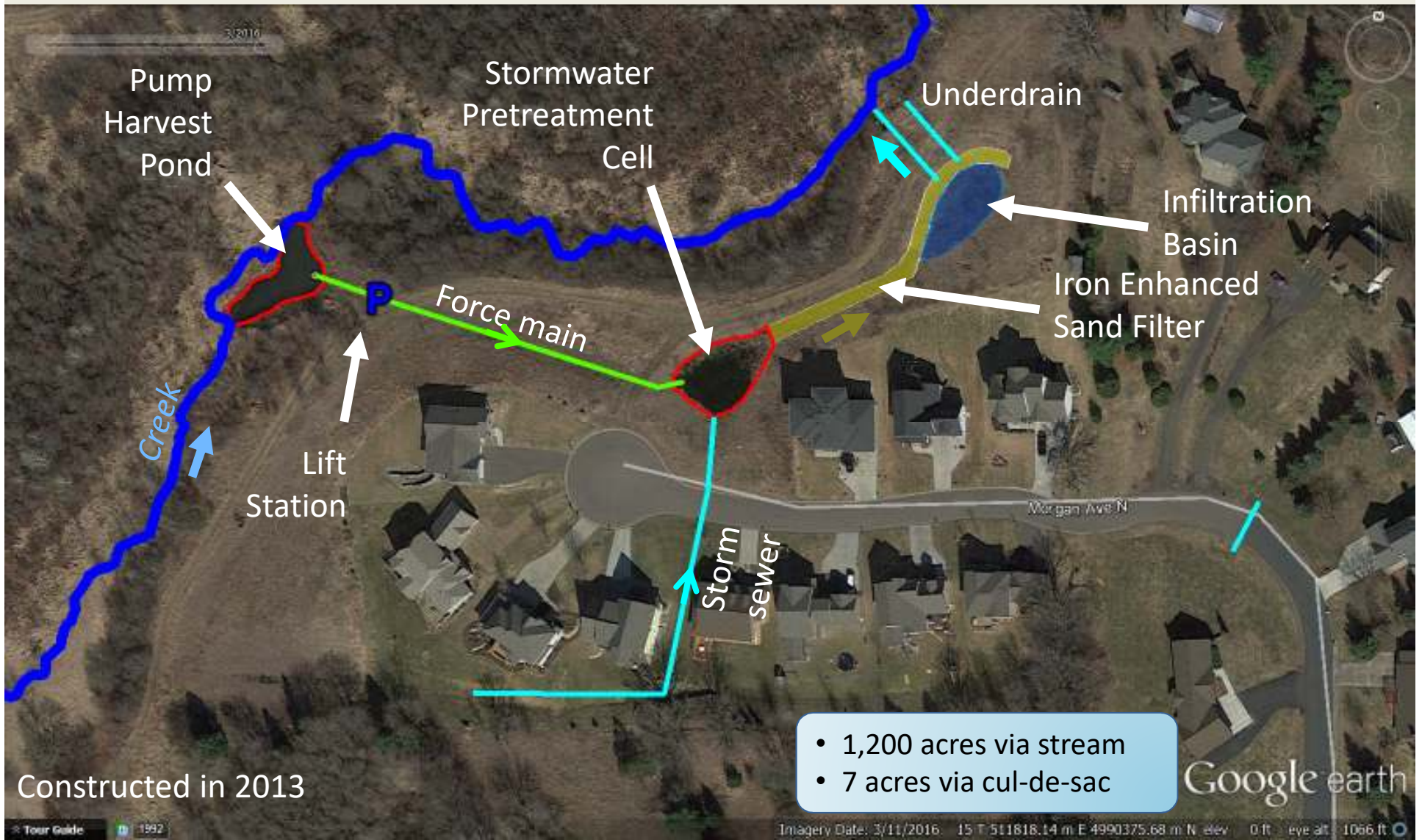
Emily Johnson, EOR



BCWD Iron Enhanced Sand Filter Performance and O&M



Filter System



Maintenance

Annual Maintenance

Filter Surface Aeration

- Breaking up the filter surface to encourage flow into filter
- Completed April 2019

Vegetation Management

- Monthly spot spraying and hand pulling weeds

Pump Inspection (bi-annual)

- Pull the pump, check oil, visually inspect impeller

Occasional Maintenance

Accumulated Sediment Removal (Pump Harvest Pond)

- Winter of 2018/19, removed approximately 200 cubic yards of material
- Sediment has accumulated in 5 years of operation
- Restore capacity of pump harvest pond

Minor Erosion Repairs at Outlet



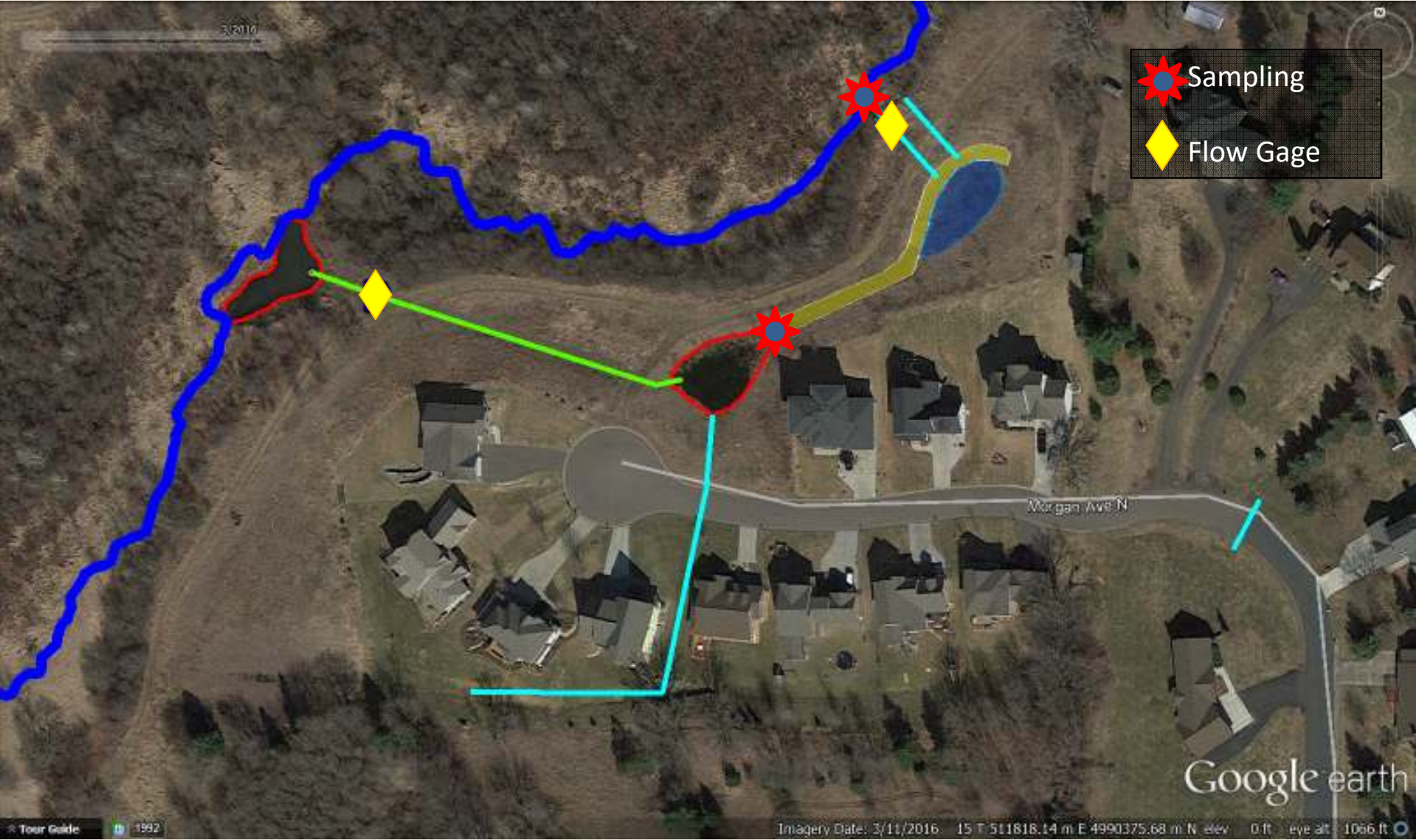
Maintenance



Above: Winter pump harvest pond sediment removal
Right: IESF surface aeration



Monitoring



Monitoring Summary

Monitoring

Rainfall:

- 32.2 inches (Annual Stillwater Area – MN Climatology)

Sampling Results (11 Events):

- Average Phosphorus IN = 0.211 mg/l
- Average Phosphorus OUT = 0.057 mg/l
- Dissolved Phosphorus Ratio = 32%

Flow:

- Pumped = 1,732,000 cubic feet (85% of total inflow)
- Neighborhood = 301,393 cubic feet (15% of total inflow)
- 47 Acre-feet Total



Monitoring Summary

Load Reduction

Estimated Load In: **27 lbs**

IESF Bed Removal: **19.2 lbs**

Cell #2 Infiltration: **3.8 lbs**

Estimated Load Out: **4 lbs**

Average filter removal efficiency:

72%

Total system removal efficiency:

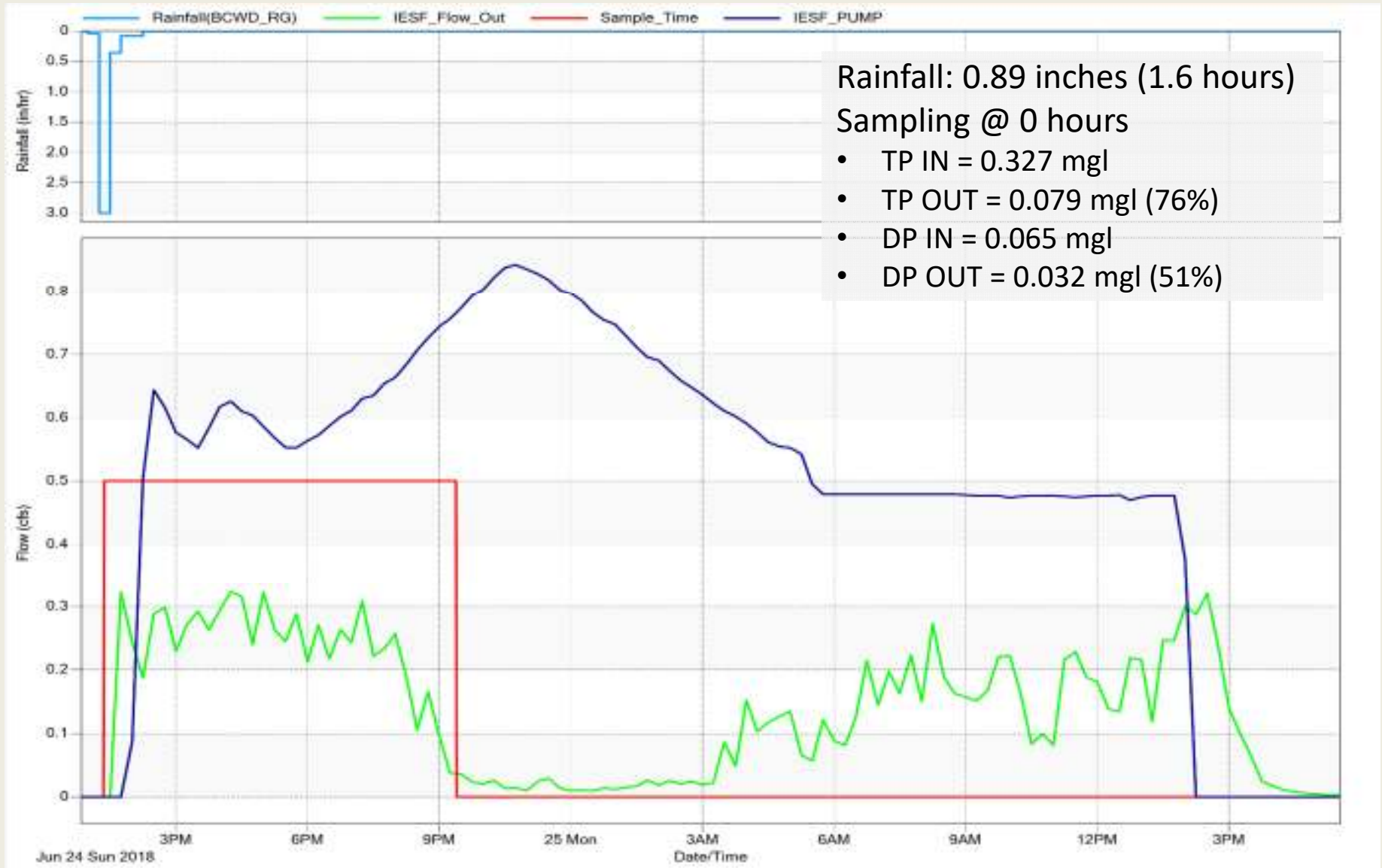
86%



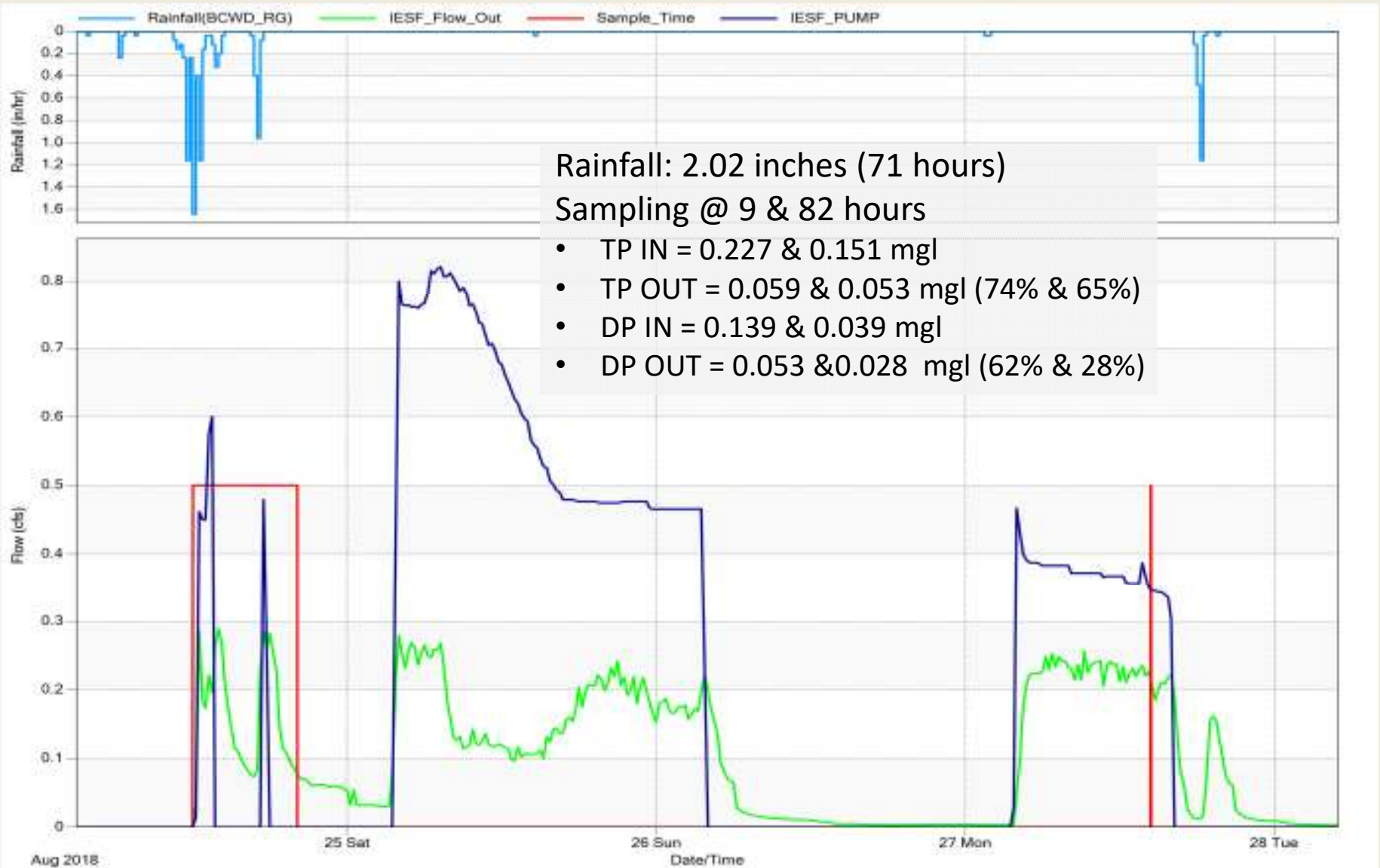
June 17 Rain Event



June 24 Rain Event



August 24 & 27 Rain Event



Conclusions

2019 Operations and Maintenance

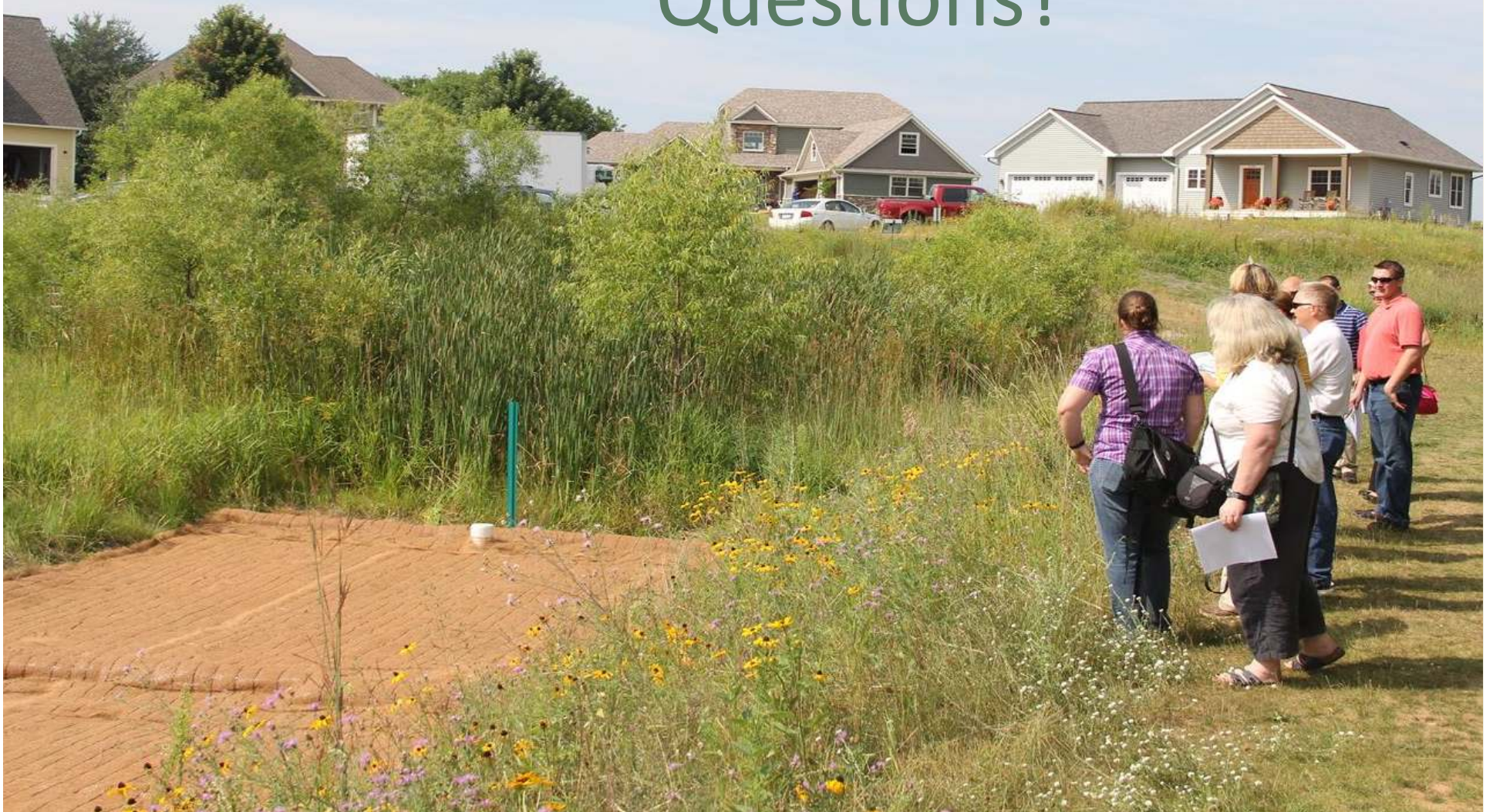
- Pump inspection
- Minor erosion repair at outlet
- Vegetation management
- Monthly inspections

2019 Monitoring

- Continue to monitor pumping from harvest pond
- Consider reducing sampling to outlet only



Questions?



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EOR water
ecology
community