



Pump and Treat Iron Enhanced Stormwater Treatment

October 18, 2016

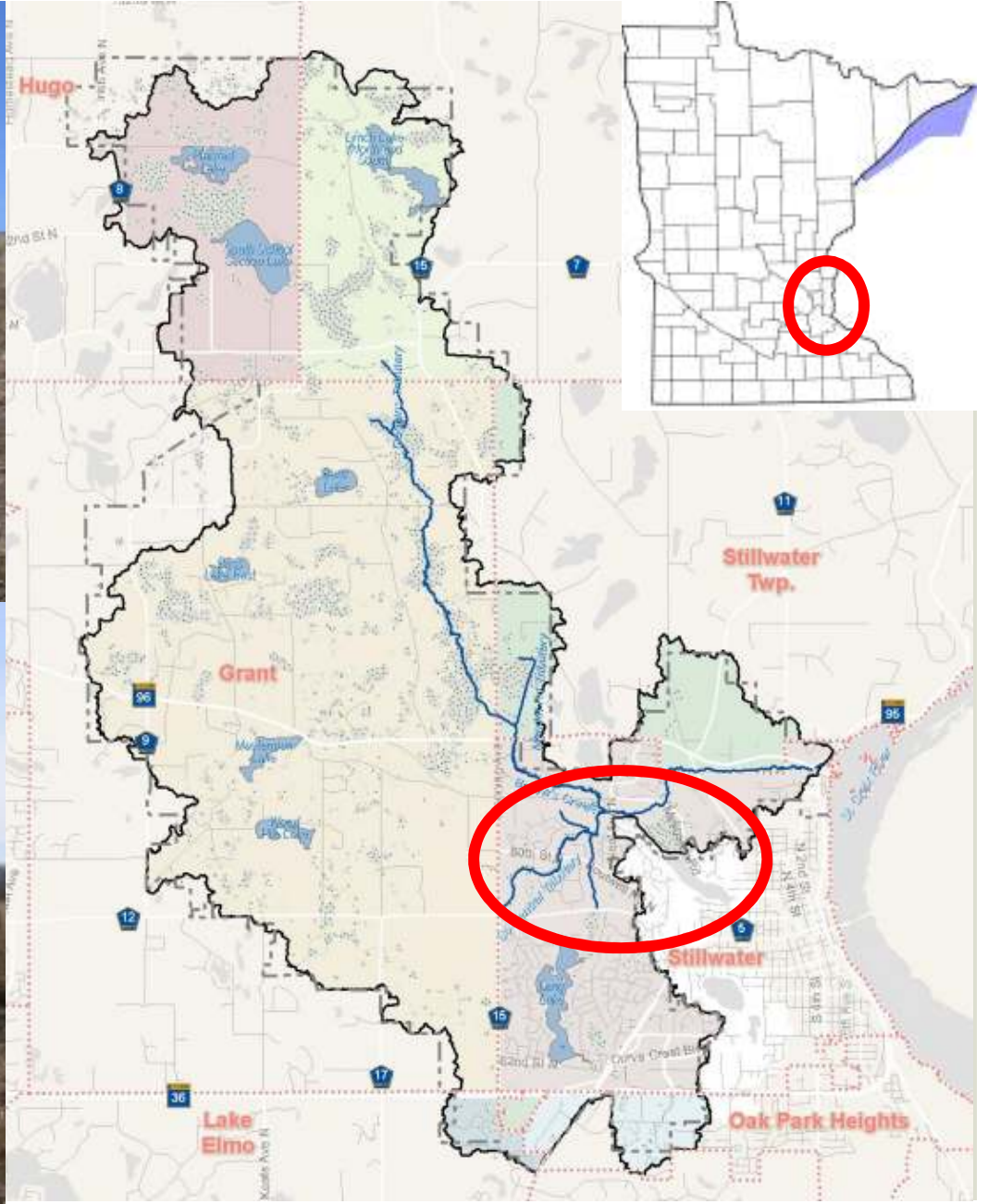
Karen Kill, BCWD Administrator

Ryan Fleming, EOR



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Collaboration



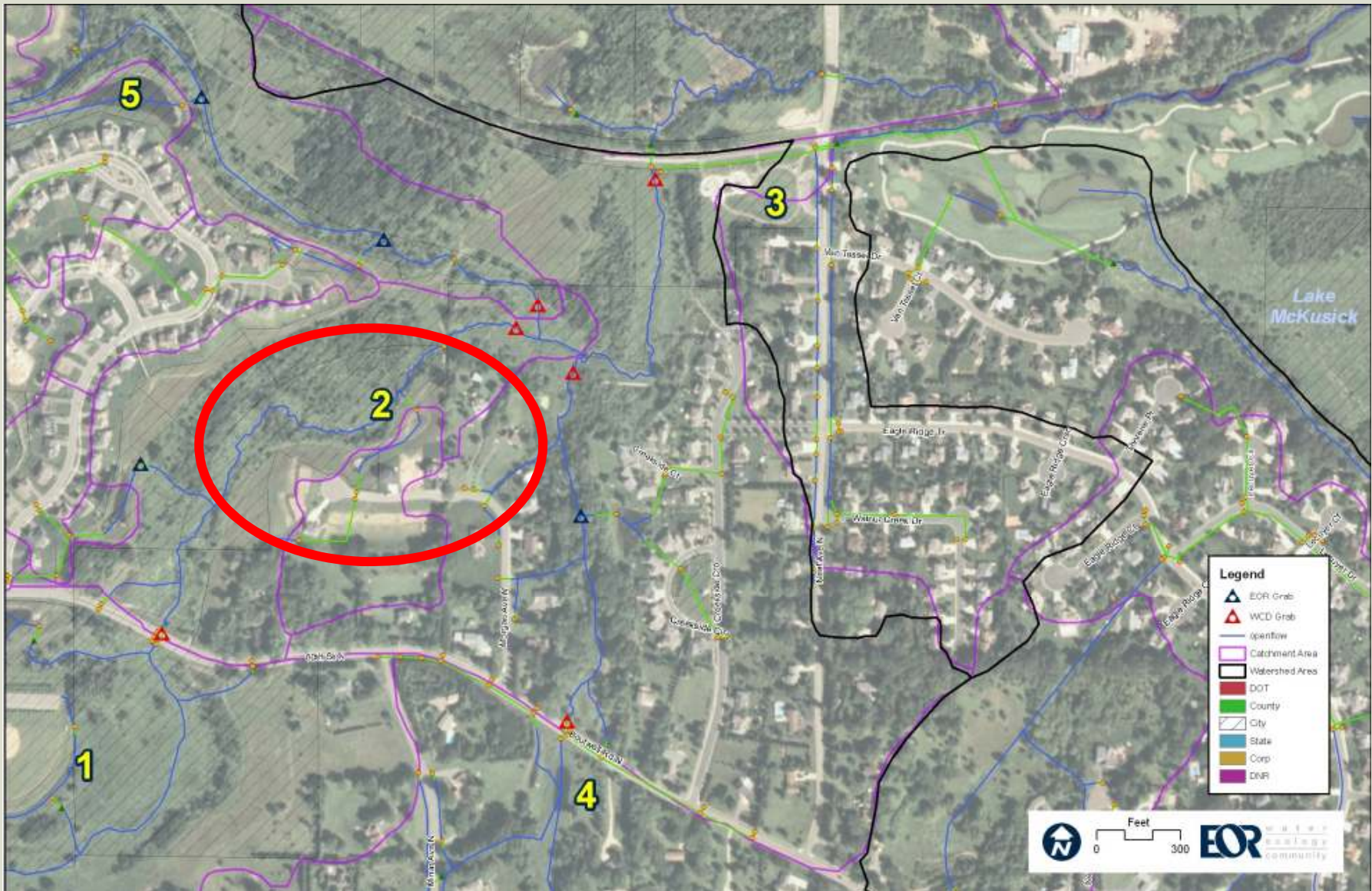
- Brown's Creek Watershed District
- City of Stillwater (also WCA LGU)
- MN DNR Waters
- Saint Anthony Falls Lab
- Neighborhood Residents



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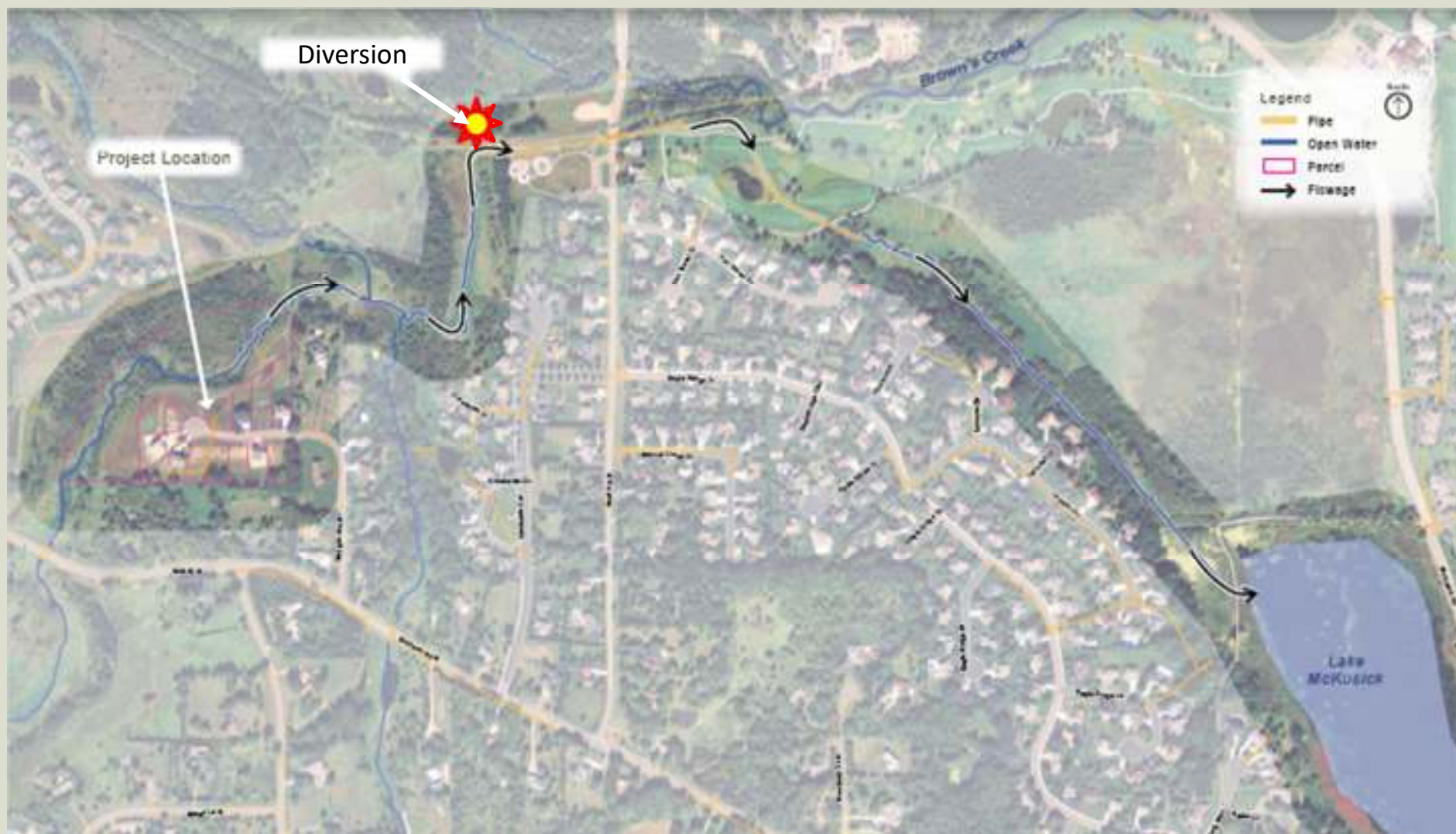
Site Selection - Location



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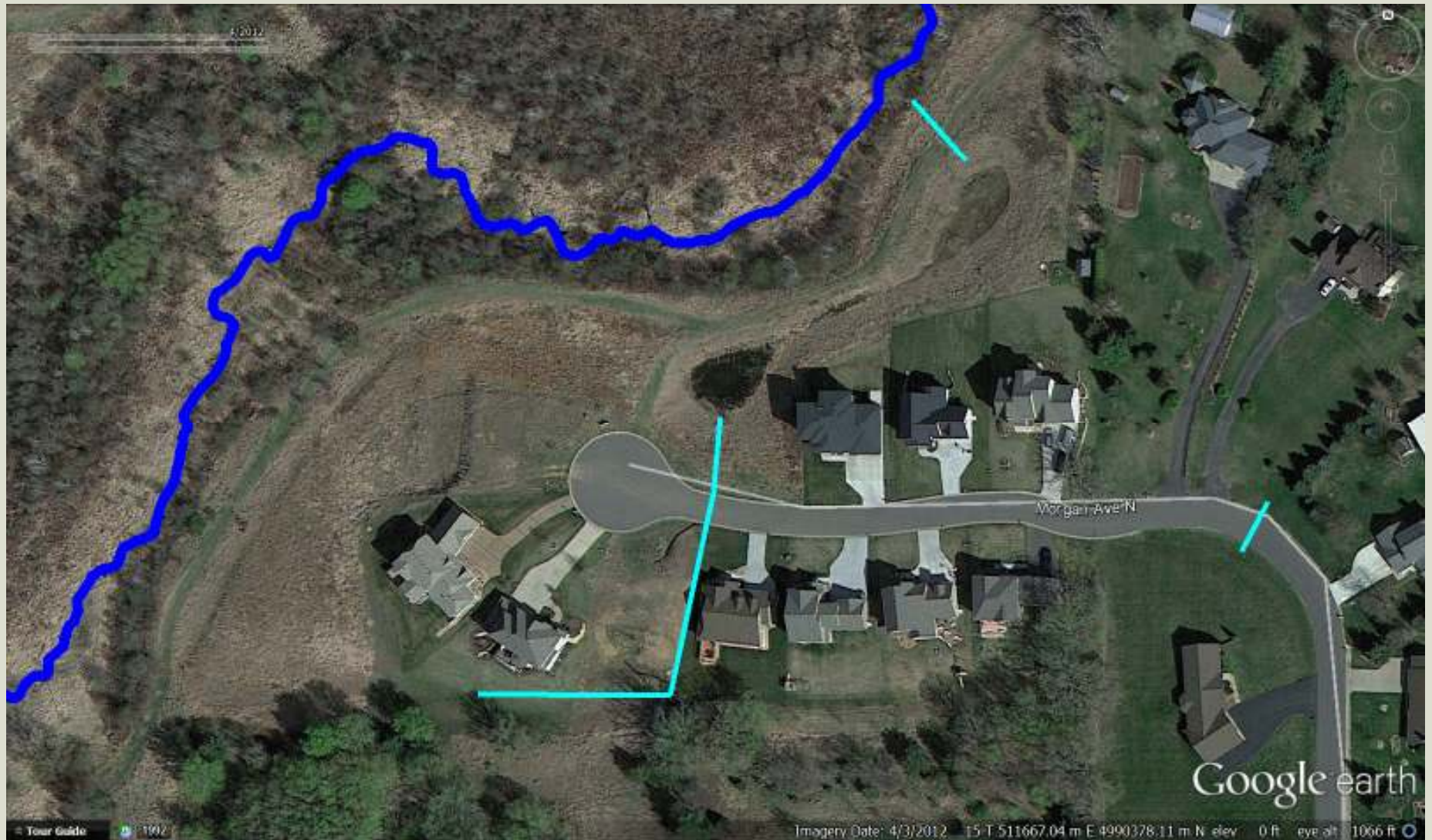
Site Selection – Drainage Area



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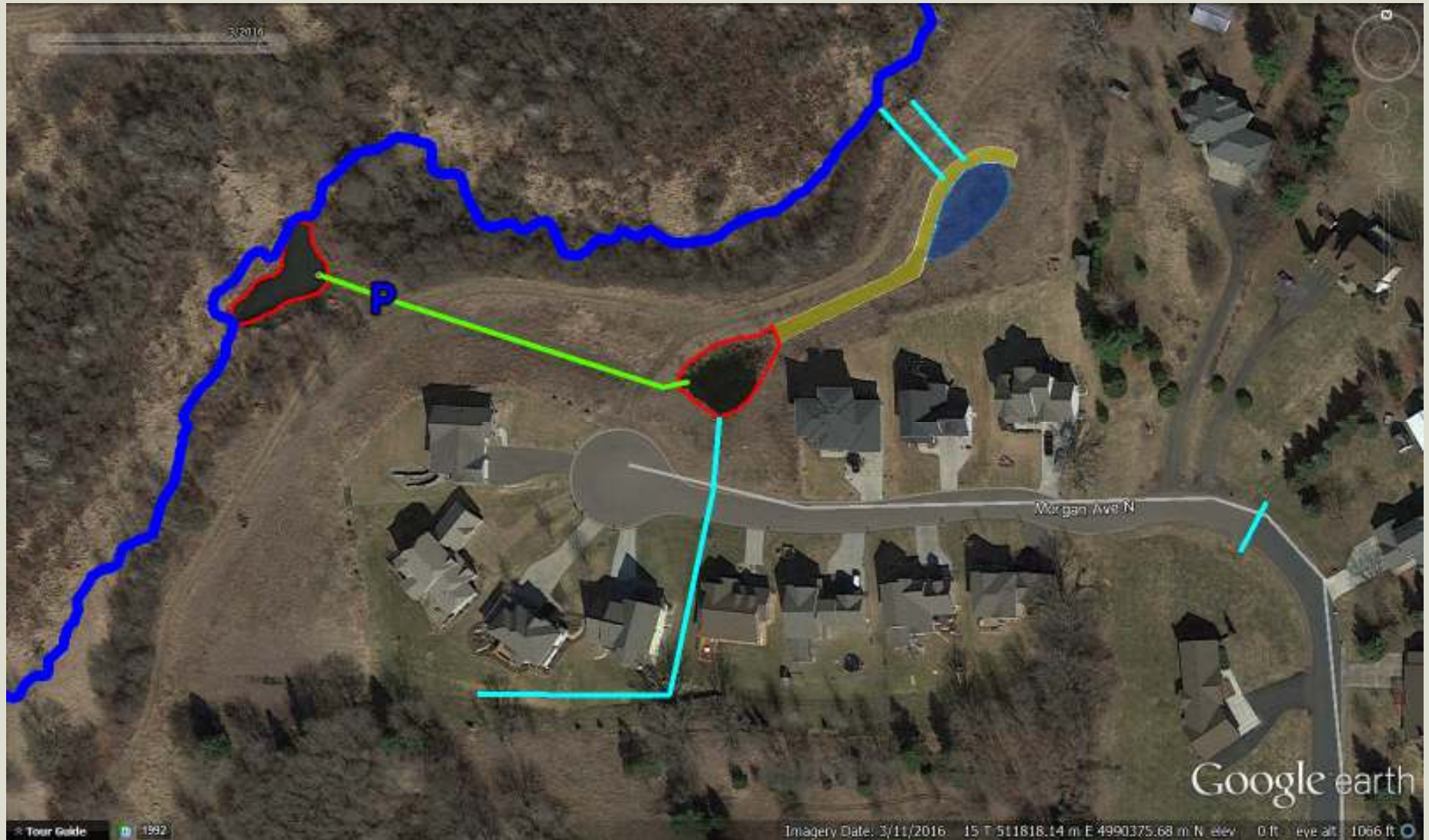
Pre-Project - 2012



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System Components



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System Components - Pump Harvest Pond



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System Components - Lift Station Control Cabinet

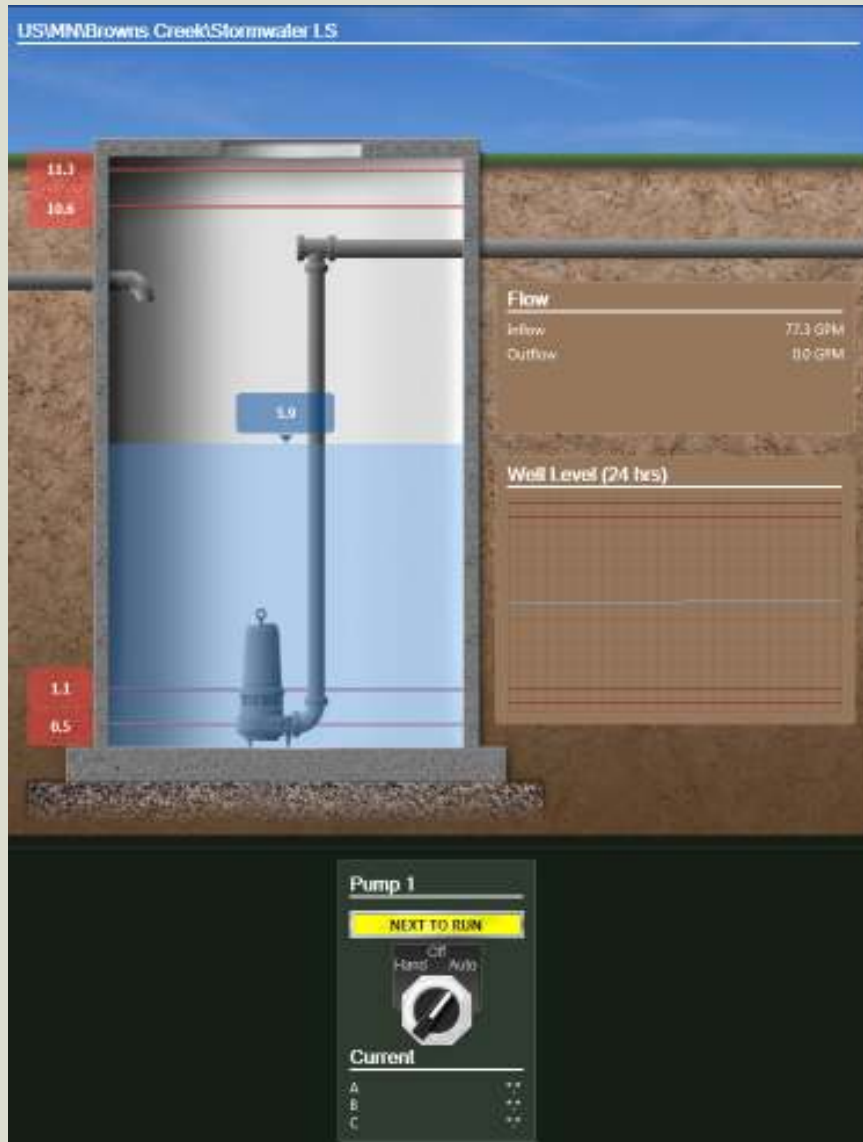


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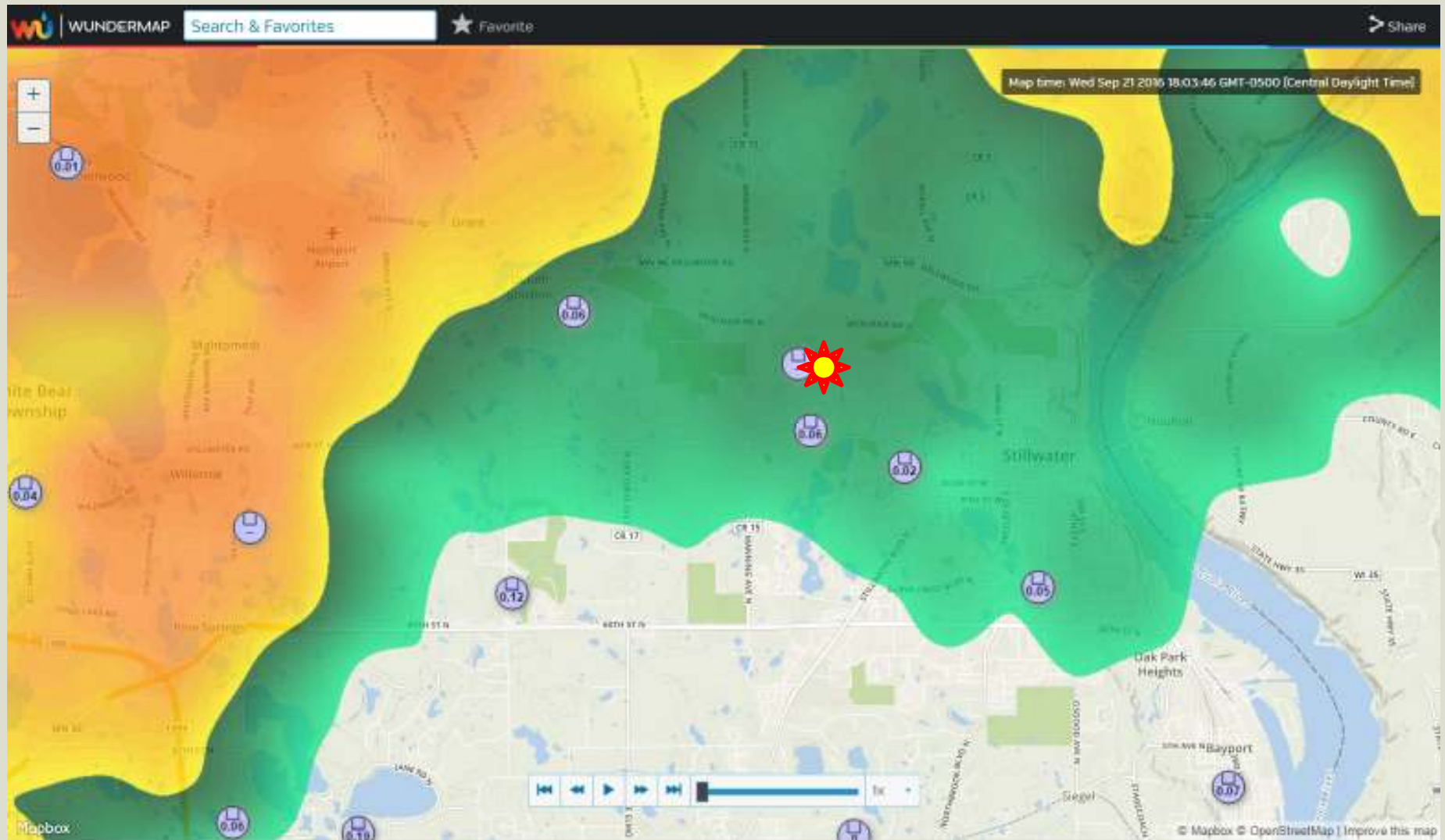
System Components - Pump Upgrades



- Inline Magnetic Flow Meter
 - Accuracy within 1%
 - Reduced Monitoring Staff Time
- Automatic Pump Speed Controlled by Water Level
 - Scalable to Reduce Bypass During Higher Flow Events
- Remote Monitoring & Control via Web Interface
 - Reduced Staff Time for Routine Checks, Trigger Point Adjustment, Response to Pump Faults, Downloading of Data



Remote Operation



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System Components - Lift Station Control Cabinet



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System Components – Pre-Project Pretreatment



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System Components - Pretreatment

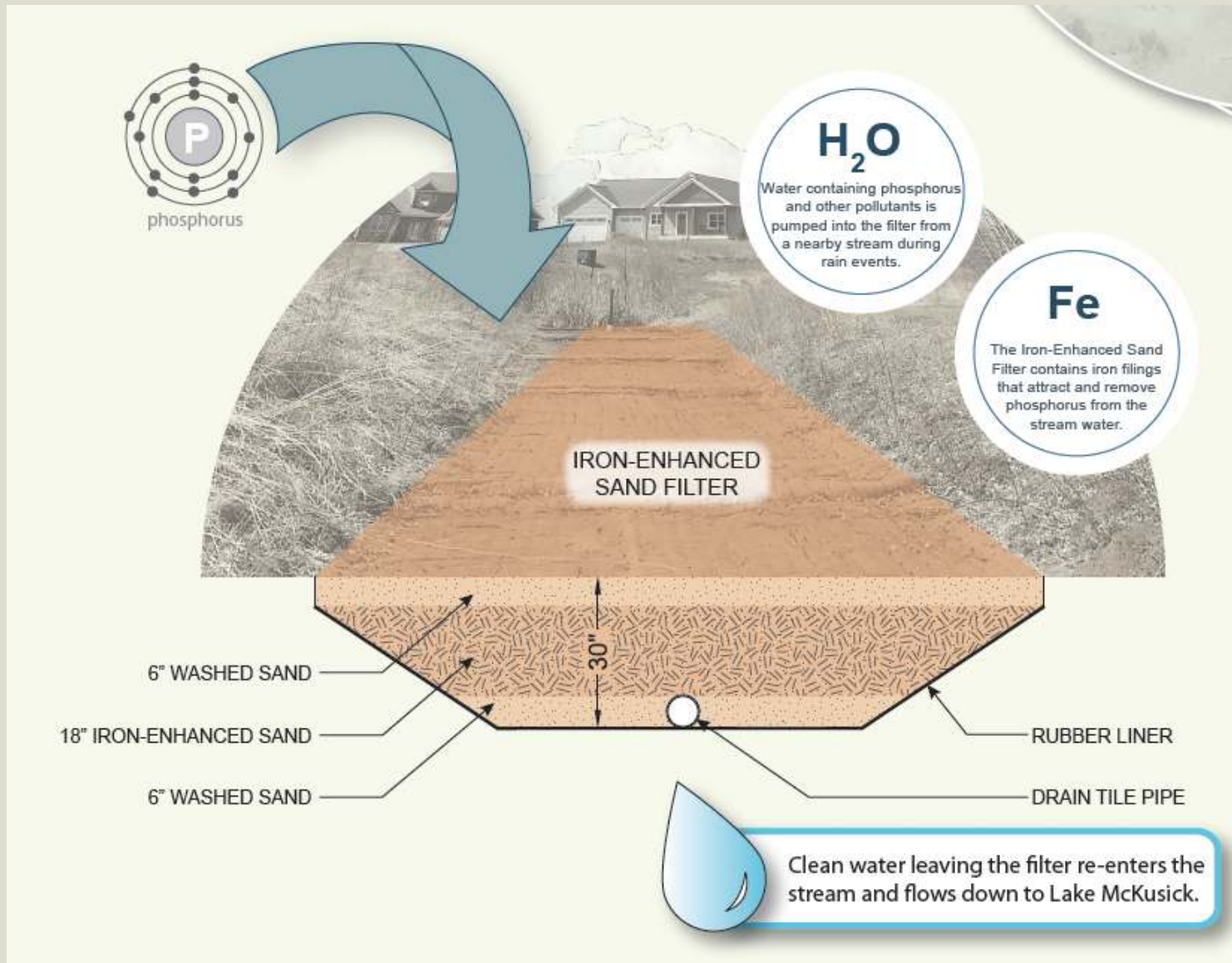


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System Components – Sand Filter



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System Components - Sand Filter



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System Components – Sand Filter

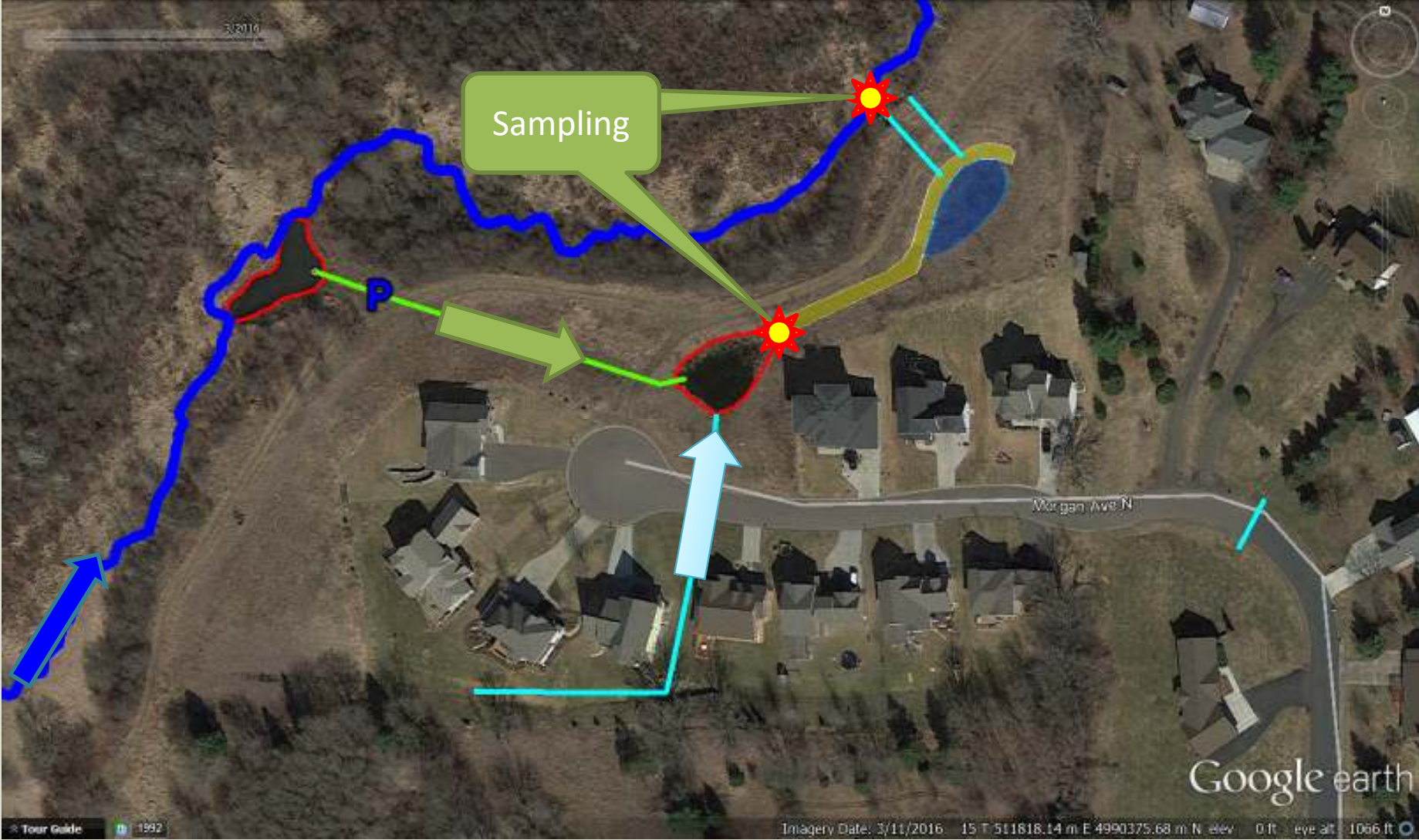


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Monitoring Locations



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Monitoring & Sampling



- Rainfall (2014-2016) ~ 107 inches
- 23 Sample Events:
 - Ave. Phosphorus IN 0.248 mg/L
 - Ave. Phosphorus OUT 0.033 mg/L
 - Range of influent concentration (0.06 to 0.390 mg/L)
 - 80-90% Consistent Removal
 - Phosphorus Removed ~ 55 Pounds (18 months of pump operation)

October 2014 samples at inlet and outlet



Project Costs



- Engineering & Construction = \$298,462 (CWF Grant = \$158,800)
- 2016 Upgrades = \$13,473
- O&M, Electric, Remote Monitoring Subscription = \$21,600/Yr
- Filter Media Replacement = \$50,000 (10-18 Years)
- 25 Year Lifecycle ~ \$650 - \$950/lb of Phosphorus



Operation & Maintenance



- Activities
 - Annual Commission/Decommission
 - Routine Observation
 - Vegetation
 - Filter Surface Maintenance
 - Remote Monitoring
 - Harvest Pond Clean Out
 - Filter Media Replacement



Project Challenges



- Catchment Drainage Characterization
 - Limited Pre-Project Monitoring
 - Harvest Pond Sizing & Pump trigger sensitivity
 - Sediment Loading to Harvest Pond
- Contractor Understanding of Project
 - Unique Operating Criteria
 - Shallow Groundwater
- Neighborhood Understanding of Project
- Heavy Spring 2014 Rainfall



Questions?



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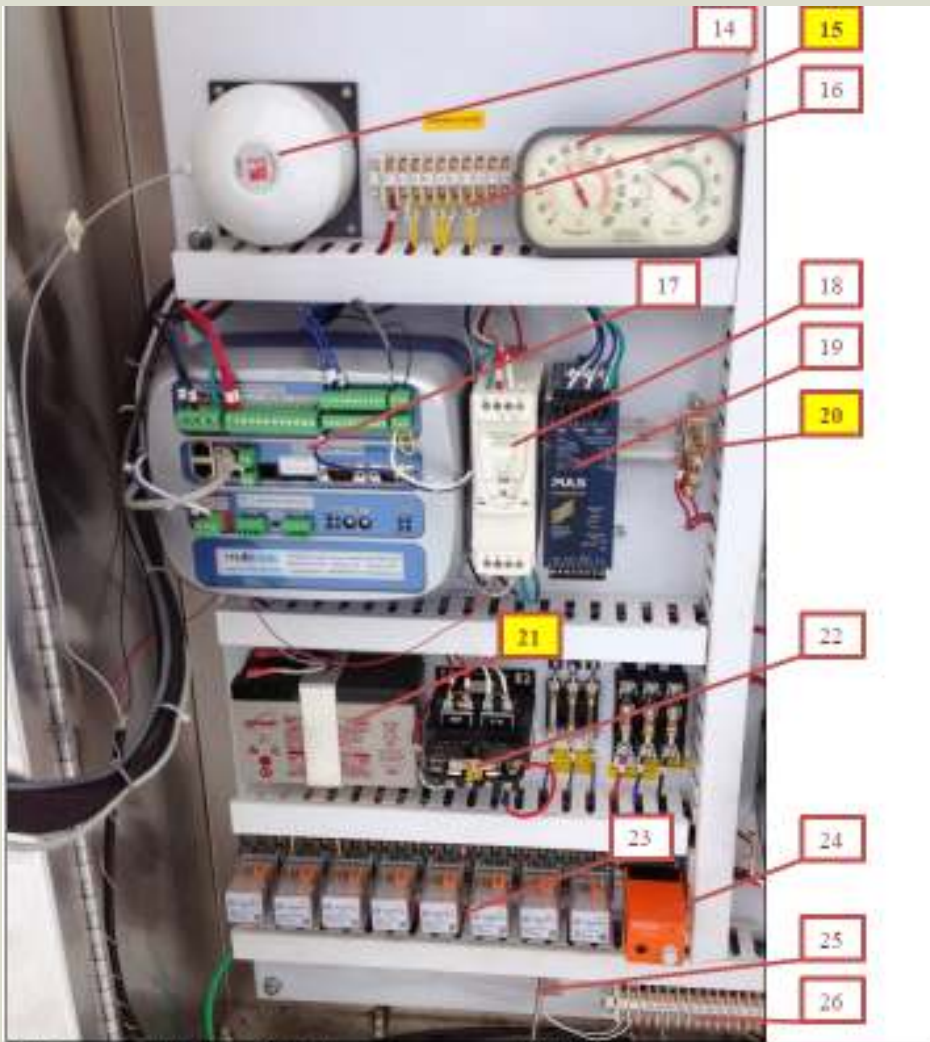
Thank You



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System Components – Control Cabinet



- O & M Manual – Rapid Reference
- Project Background & Ownership
- Activity Inspection Sheets
- System Componentry
- Summary of Annual Activities
- Product Literature and Instruction Manuals

14. Transducer Moisture Protection	21. Battery
15. Cabinet Thermometer	22. Control Circuit Transformer (CCT)
16. Terminal Strip Auto Dialer (TS-E)	23. Control Relays (R1-8)
17. MultiSmart Pump Controller (MSPC)	24. Pump Seal Moisture Relay (MR)



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