

# Collection System Improvements and Efficiency

March 21, 2024



# SEDAC

SMART ENERGY DESIGN ASSISTANCE CENTER

*Providing effective energy strategies for buildings and communities*

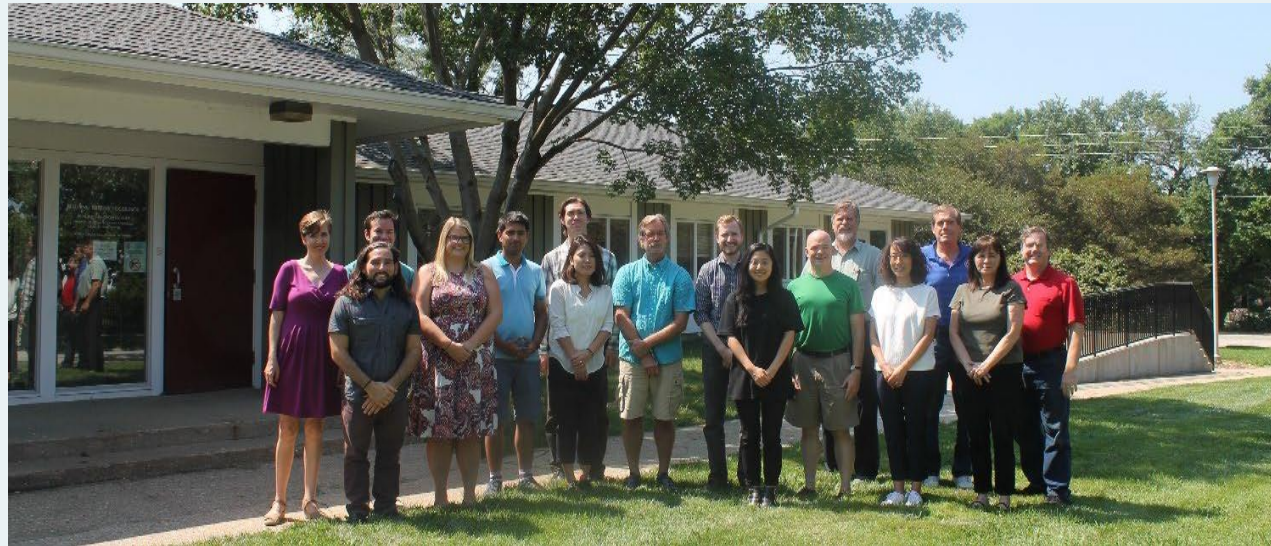


# Who We Are

We assist buildings and communities in achieving energy efficiency, saving money, and becoming more sustainable.

We are an applied research program at University of Illinois.

**Our goal: Reduce the energy footprint of Illinois and beyond.**



# ISTC Mission

**To encourage and assist citizens, businesses and government to prevent pollution, to conserve natural resources, and to reduce waste to protect human health and the environment in Illinois and beyond.**





# Upcoming Field Day

**May 15, 2024**

Field Day Announcement!

Tour of Algaewheel Process: Distributed treatment system for Bookwalter Woods MHP near Gardner, IL

Algal Treatment Processes Workshop: Location TBD

- Applications at distributed and central WWTPs
- Benefits for nutrient removal and energy consumption
- Side-stream income opportunities



# About the IEPA PWI Energy Efficiency Program

The Illinois EPA Public Water Infrastructure Energy Assessment Program helps municipalities reduce the cost of water and wastewater treatment.

- NO-COST energy assessments and technical assistance
- Comprehensive report listing:
  - Cost of upgrades
  - Estimated payback period
  - Any applicable incentives or funding opportunities
- Operator continuing education events



Funding provided in whole or in part by the Illinois EPA Office of Energy. This program is in partnership with the U.S. Dept. of Energy Sustainable Wastewater Infrastructure of the Future (SWIFT) Accelerator for energy efficiency in wastewater treatment.



U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy



# Why Complete an Energy Assessment?

## Older Existing System or No Previous Assessments?

Identify missed opportunities

Plan for capital improvements

Uncover what is possible

3<sup>rd</sup> party support for personnel's ideas

## New or Recently Upgraded?

Always more to improve

Plan for future opportunities outside the scope of recent projects

New technologies and processes always in development

**Identify opportunities for repairs or upgrades and associated funding!**





# Apply for an Energy Assessment!

## Step 1: Initial Application – Pre-Qualification

- Apply at [www.smartenergy.illinois.edu/water](http://www.smartenergy.illinois.edu/water)
  - Be located in Illinois and be publicly-owned
  - Allow SEDAC/ISTC to visit site – remote visit is an option!
  - Be willing to share facility information
  - Share final assessment report with Illinois EPA

## Step 2: Data Collection

- Facility information –Process flow diagram, types of processes, etc...
- 2 years of utility bills and MORs
- We're here to assist!

## Step 3: Site Visit Scheduled



# Collection System Improvements

- Abating Inflow and Infiltration
- Lift Station Monitoring and Remote Clog Removal
- Collection System Rags Separation
- Preventing Fatbergs and other FOG Issues
- Abatement at source
  - Education
  - Mechanical separation
  - Grinding





# Session Speakers



- Joseph Sullivan – Robinson Engineering on I&I
- Shawn Maurer – SEDAC on Lift Stations & Solids Management



# Collection System I&I Overview

I&I is a concern because:

- Absorbs collection system capacity
- Can overflow to environment
  - Emergency repairs if erosion damage results
  - Hazardous materials clean-up cost
- Can cause erosion damage over time
  - Sink holes near lines
  - Exacerbate leaks due to loss of soil support



# Lift Station Improvements

- VFDs popular for tuning pumping, preventing pressure transients, and saving energy
- Slowing pump *can* make clogging more frequent
  - Can set higher minimum flows to prevent clogging
  - Some advanced VFDs can detect & automatically clear clogs
  - Add-on devices can detect changes to pump torque, and initiate cleaning cycle



Image Source: [CallMeColt YouTube Channel](#)





# Lift Station VFDs

- VFDs effective for energy savings
- Also can reduce wear and tear by reducing in-rush current and pressure transients
- Must be careful not to exacerbate clogging issues
  - Set min speed that ensures draw-through of debris
  - Min speed should also maintain downstream suspension of solids
- Select control profile that matches needs

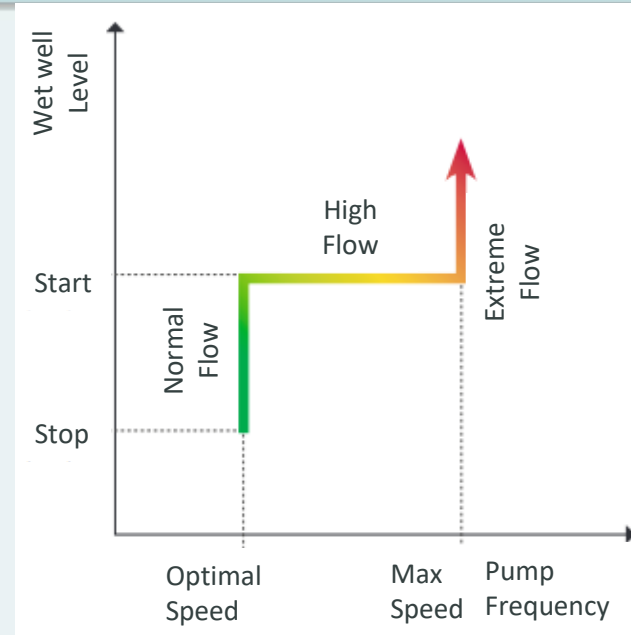
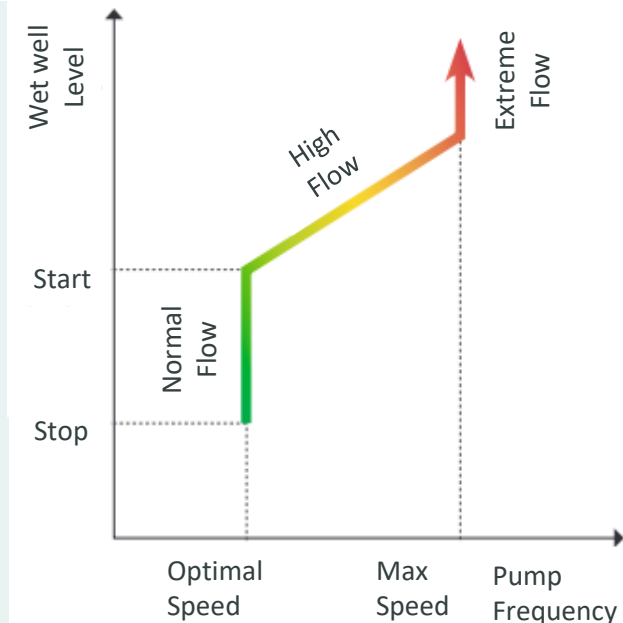


Image sources: Xylem.com



# Lift Station Macerators/Grinders

- Grinders can break up solid materials into smaller pieces
  - Smaller pieces less likely to clog lift pumps
  - Can shorten rag lengths
- There are some potential downsides
  - Rags can reform downstream if sewer main long enough
  - Smaller pieces may bypass screening at plants, causing issues in process



Image source: [franklinmiller.com](http://franklinmiller.com)



# Lift Station Solids Separation

- For trouble spots with frequent ragging/solids issues, solids separation may be best option
  - Solids can't reform downstream
  - Must set up waste collection at lift station
  - Can install enclosed container for odor control



Image source: [franklinmiller.com](http://franklinmiller.com)





# Lift Station Cleaning

- Lift Station wet wells can accumulate FOG and other floating debris.
  - Drawdown after accumulation can clog pumps
  - Flat-bottom wet wells can't draw heavier solids through pump
- Trench-bottom wet wells can draw down for self-cleaning
  - Lets solids settle near pump area of influence
  - Can draw floating debris to pump inlet area of influence
  - Greatly reduces cleaning maintenance



Image source: [hidrostal.com](http://hidrostal.com) PreroClean brochure



# Questions?

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