Wastewater Headworks Screening for Smaller Plants

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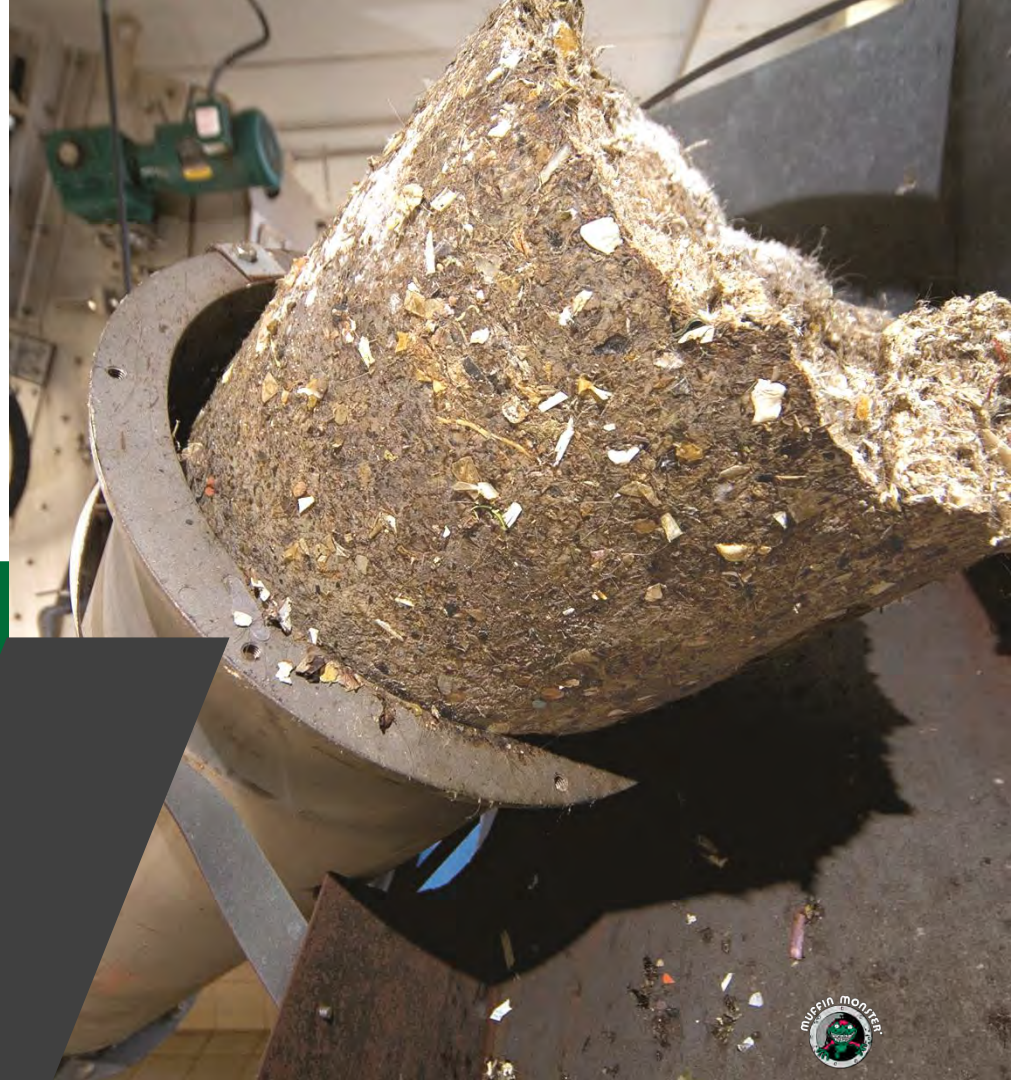
MUFFIN MONSTER

TOPICS

1. Screens role at headworks
2. Screening challenges at small facilities
3. In-channel auger fine screen



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What is the role of the Headworks?

Remove wastewater debris

Typical headworks processes

- Screening
- Compacting and Dewatering
- Conveying
- Grit removal

Why use screens?

- Separates larger solids from liquid stream
- Protects sensitive downstream equipment
  - MBRs, centrifuges, pumps, mixers…
- Eliminates accumulation of inorganic debris in treatment process
  - Prevents debris from collecting in digestors and clarifiers
  - Reduces clogging of pumps, valves and pipes

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Why use screens?

Optimizes separation treatment processes

- Clogging due do debris reduces aeration efficiency by as much as 70%
- Improves digestion efficiency

Debris must be removed from final waste stream product

- Effluent discharge
- Sludge for land applications

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Why use screens?

Lowers plant operational expense

- Reduces maintenance expense on downstream equipment
- Lowers treatment costs
- Lowers energy costs
    - Equipment running efficiently uses less energy

Screening challenges at smaller facilities

Small facility examples

- WWTP of small towns (<2 MGD)
- Prisons
- Resorts
- Institutions with water treatment facility

Challenges

- Smaller budgets
- Reduced Staff
- Lower flows
- Smaller footprints
- High or unique solids loading

Screening options at small facilities

Manual Bar Screen

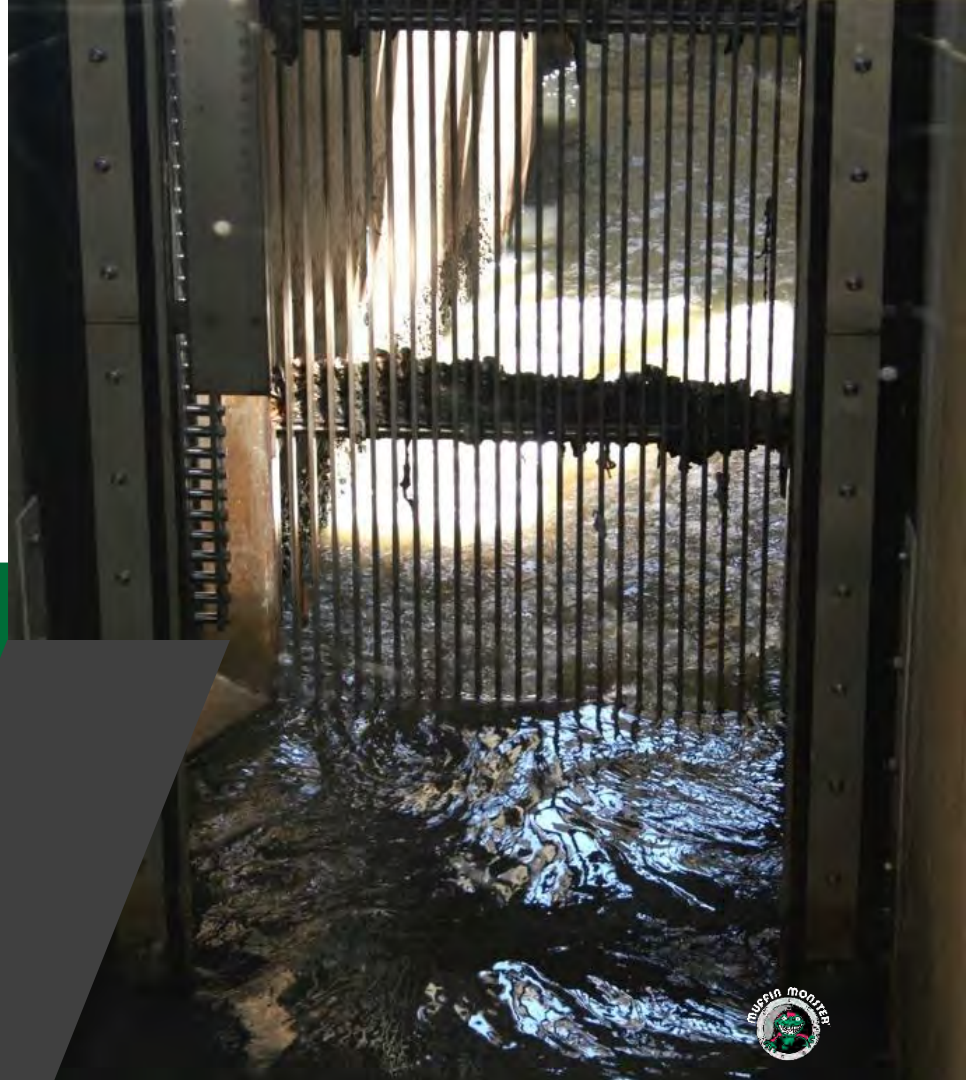
- Vertical bars with spacing of 1 to 2 inches (typical) to catch debris
- Operators periodically rake screen to remove solids to prevent build-up

Automatic Bar Screen

- Vertical bars with space 3/16 inch and up (typical) with automated raking system

Perf Plate Cylindrical Screen

- ¼” Perforated Plate



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Manual bar screen

Benefits

- Economical
  - Inexpensive compared to other screening options
- Quick and easy to install
- Fits into tight locations

Disadvantages

- Requires human operator to rake screen
  - Health and safety hazard
  - Unpleasant job
  - Very labor intensive
- Disposing wet, fecal loaded material
- Screens only coarse materials

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Automatic bar screens

Advantages

- Significantly costlier than manual bar screens but typically less expensive than fine screens
- Screens significantly finer than Manual Screen

Disadvantages

- Civil work typically needed to install screen
- Need to dispose of wet, fecal laden screenings
  - Washer/compactor equipment can address this challenge
    - Additional equipment adds expense in capital and operational expense

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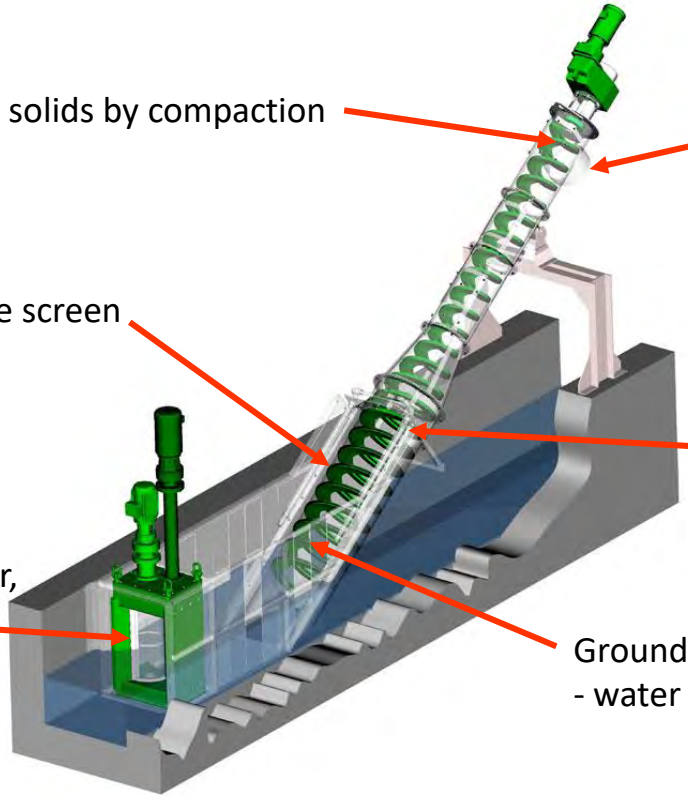
Screening options at small facilities

In-channel auger fine screen

- Cylindrical perforated screen captures solids
- Auger removes solids upward
- Wash zones rinses organics back into wastewater screen
- Compaction zone dewaters and compacts screens
- Optional adders to in-channel auger fine screen
  - Dual shafted grinder in-front of screen
  - Continuous bagging system

All-in-one screening, washing and compacting solution

In-channel auger fine screen



Dewater solids by compaction

Clean, compacted solids discharged to disposal container/bag

Auger moves solids up the screen

Solids washed during transport upward – more organics returned to waste stream

All flow passes through grinder, reducing size of solids

Ground solids captured on perforated screen - water and organics pass downstream

Pretreat Solids with Grinding

Purpose of grinding

- Grinding puts organics, i.e. fecal material, back in the plant flow, not in your dumpster
  - Breaks open solids that have trapped organics
  - Organics washed back into wastewater stream
- Shreds large debris that can damage screen and auger

Benefits of grinding

- Screenings are lighter, drier
  - Lowers disposal cost
- Screenings are cleaner, less odorous
- Organics are returned to wastewater stream for processing

Perforated screen

- Typically 6 mm perforated trough with smaller openings available
- Brush on auger keeps perforations clear
- Auger moves solids upwards out of wastewater stream

Benefits of perforated screen design

- Captures rags, plastics, latex and other debris that bar screens let pass (higher capture rate efficiency)

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Wash zone

- Liquefies and removes soft organics from solids
- Organics returns to wastewater stream

Benefits of washing removed solids

- Reduces odor of discharged material (cleaner discharged screening)
- Washes organics back into wastewater treatment process (food for biological process)

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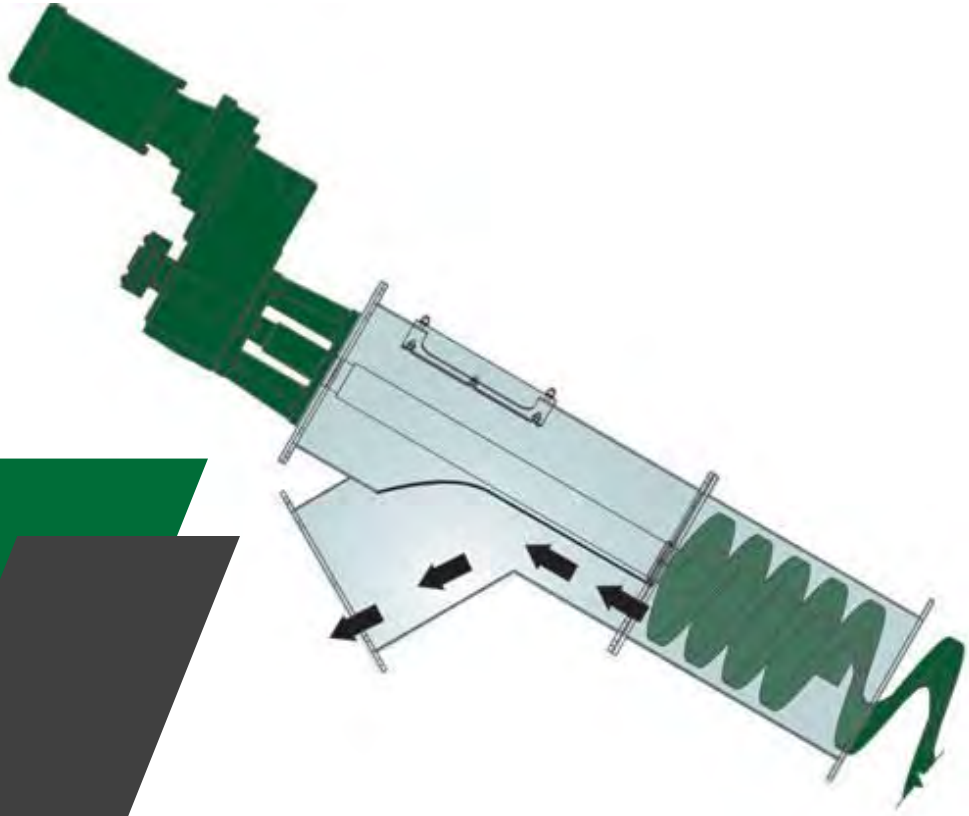
Compaction

- Dewaters screenings
- Compacts material to reduce volume

Benefits of compaction

- Lowers landfill/disposal costs
- Volume reduction
- Liquid content reduction



Bagger system

- Captures discharged solids in disposable bag

Benefits of bagger

- Clean and sanitary
  - Tear-off, pull down, tie-off
  - No need to touch debris
- Helps contain odors

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Bridgewater Correctional, MA

Rhode Island Department of Corrections, Cranston, RI

Manchester WWTP, CT

Hampden County Corrections, Ludlow, MA

New Hartford WWTP, Hartford, CT

All-in-one headworks solution

In-channel auger fine screen

- Fine screening, washing and compacting in one system
- Grinding in front improves cleaning of screenings and returns more organics back to waste stream
- Designed to fit in existing channels minimizing civil work
- Eliminates need for separate washer compactor
  - Less capital expense for headworks screening solution
- Relatively small footprint
  - Fits in tight spaces

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Question Time

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