

# WELCOME TO THE ZEELAND CLEAN WATER PLANT



# FIRST IMPRESSION IS IMPORTANT !!



Credit – Waters and waste digest



www.shutterstock.com - 112614455

Credit – UPS Technologies



**WATER  
RESOURCES  
UTILITY OF THE  
FUTURE  
TODAY**

RECOGNIZED FOR EFFECTIVE  
UTILITY MANAGEMENT (EUM)



Credit – MooreandBuggink engineering

ZEELAND IS A PLACE WHERE PEOPLE CAN COME TO DO MANY THINGS WITHOUT WORRY OF HARMFUL ENVIRONMENTAL CONCERNS.



UNFORTUNATELY, THERE ARE CITIES AROUND THE WORLD STILL LACK THE PROPER INFRASTRUCTURE TO TREAT SEWAGE CAUSING MAJOR HEALTH CONCERNS.



# Wastewater treatment is essential for several reasons....



Protect the Environment

[unece.org](http://unece.org)



Protect Human Health

[Forbes.com](http://Forbes.com)



Preserve our water supply

[Energy.gov](http://Energy.gov)

THE ZEELAND CWP RECEIVES FLOW FROM THE CITY OF  
ZEELAND, HOLLAND AND ZEELAND TOWNSHIPS FOR A  
COMBINED DAILY AVERAGE OF 2.4 MGD

**(365 DAYS X 2.4 = 876,000,000 ZEELAND CWP YEARLY)**



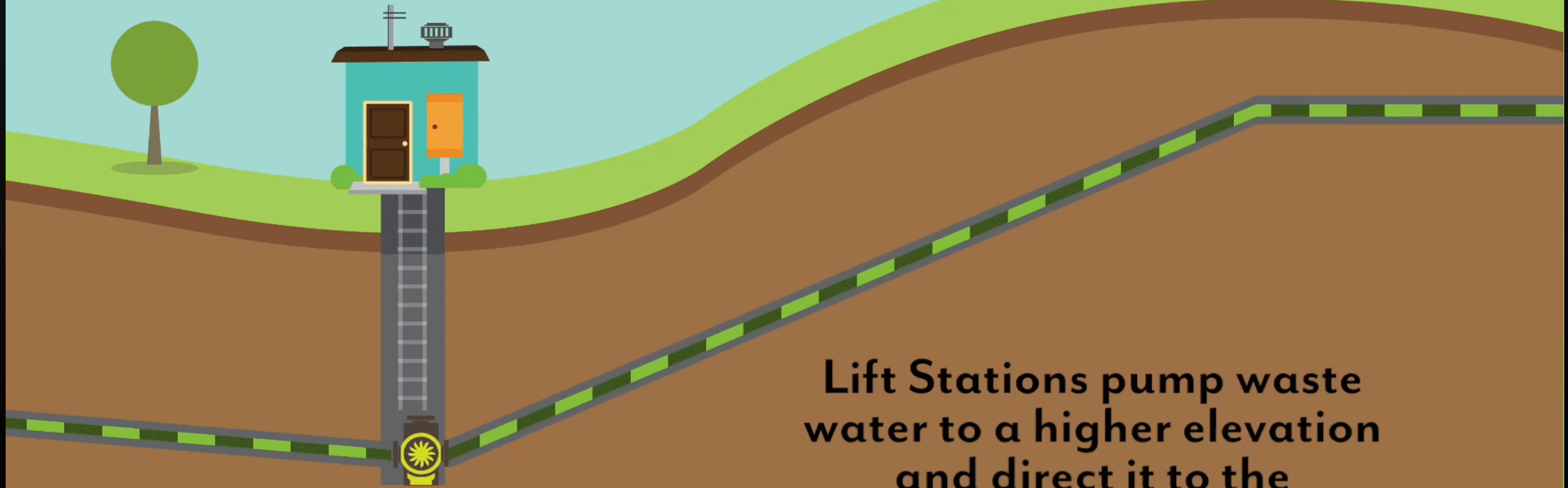
Holland Charter Township



# WHERE DOES IT COME FROM ??



# HOW DOES IT GET HERE ?



**Lift Stations pump waste water to a higher elevation and direct it to the waste water treatment facility**

# REGULATORY COMPLIANCE



- Environmental protection agency (EPA)
- Michigan Department of Environment, Great Lakes and Energy (EGLE)
- Ottawa County Health Department

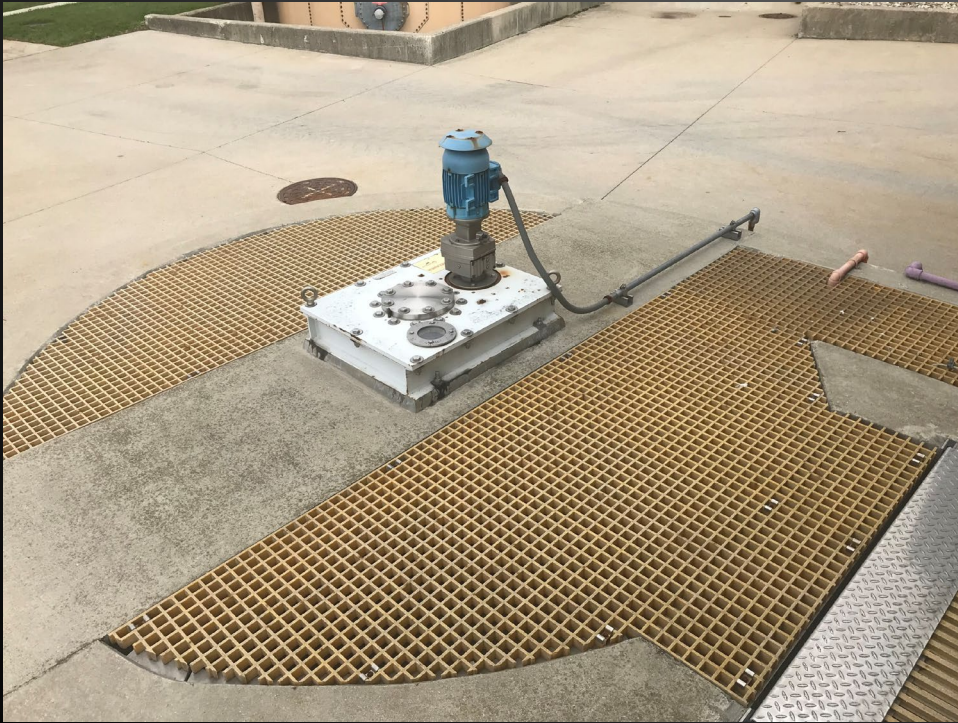
# PLANT HEADWORKS

WASTEWATER FLOWS TO THE PLANT BY A SYSTEM OF UNDERGROUND TRUNK SANITARY SEWERS IN THE CITY OF ZEELAND, ZEELAND TOWNSHIP AND PARTS OF HOLLAND TOWNSHIP. SCREENING STRUCTURES REMOVE INORGANIC MATERIALS FROM THE WATER.



# GRIT REMOVAL

INORGANIC MATERIAL IS REMOVED BY A VORTEX GRIT REMOVAL SYSTEM.



# PRIMARY TREATMENT

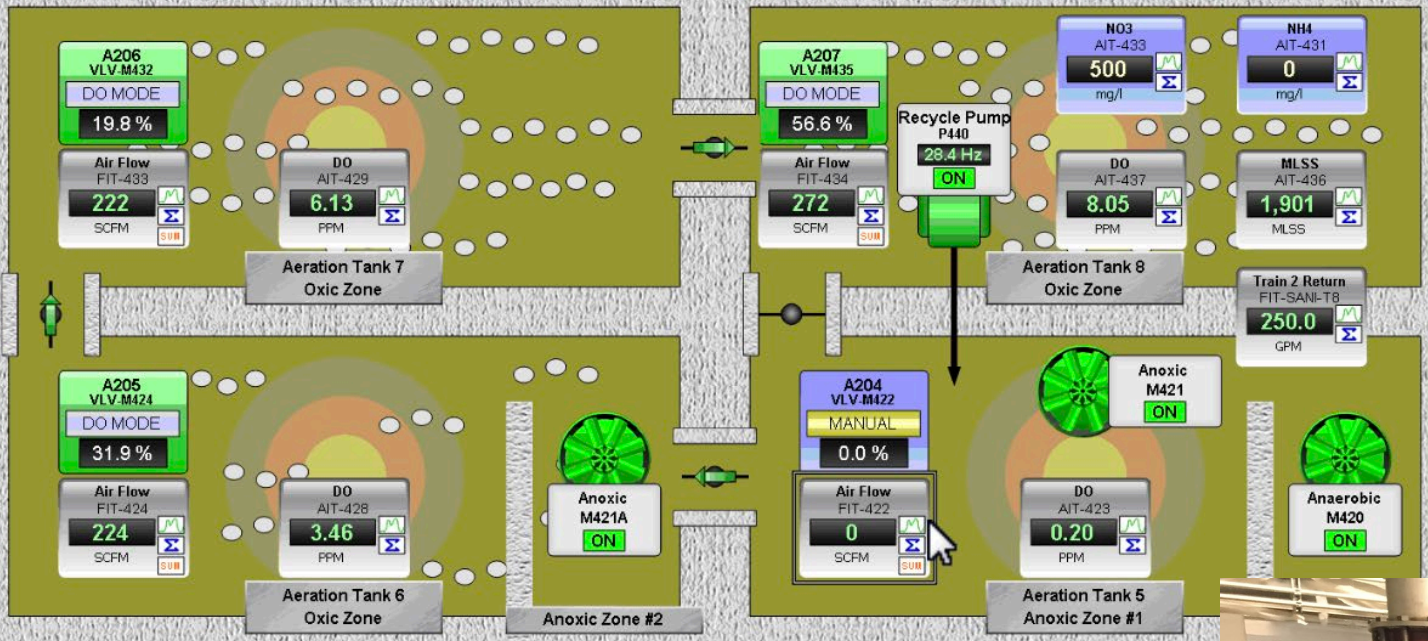
INCOMING FLOW IS SLOWED USING FIVE LARGE PRIMARY TANKS TO ALLOW HEAVIER ORGANIC MATERIALS TO SETTLE OUT OF THE WATER. THESE SOLIDS CONTAIN EXCESS NUTRIENTS SUCH AS NITROGEN AND PHOSPHOROUS. THE PRIMARY EFFLUENT THEN FLOWS BY GRAVITY INTO ONE OF THE TWO AERATION TRAINS FOR BIOLOGICAL NUTRIENT REMOVAL (BNR) PROCESS.



# Secondary Treatment

The secondary process utilizes a Biological Nutrient Removal (BNR) treatment process. Large volumes of microscopic organisms are kept suspended in tanks using diffused air bubbles feed on dissolved nutrients.





Train 2 Weir LIT-T2-WEIR: 2.2 Inches

Effluent Flow FIT-616: 2,394 MGD

Train 1 Weir: 2.1 Inches

Final Clarifiers

Ortho-Phosphate BIO-CP: 0.000 mg/l

Xylem Data

Primary Tanks

RAS FIT-707: 0.753 MGD

RAS 2 Flow

Turbo Blowers: Turbo 1 (0 SCFM), Turbo 2 (0 SCFM), Turbo 3 (1,493 SCFM)

Train 2 Flow FIT-SUM: 718 SCFM

Energy Intensity Calc: 960.6 W/CF

Turbo Blowers Not Running

Oscar Panel PanelView

Turbo Blowers All Off Delay: 11.00 Mins

- Lift Stations
- System Overview
- Head Works
- Primary Treatment
- Primary Tanks
- Secondary Treatment
- RAS Train 1
- RAS Train 2
- GBT System
- UV System
- Effluent Pump Station
- Aerobic Digestion
- Solids Handling
- RAS Building
- Blowdown

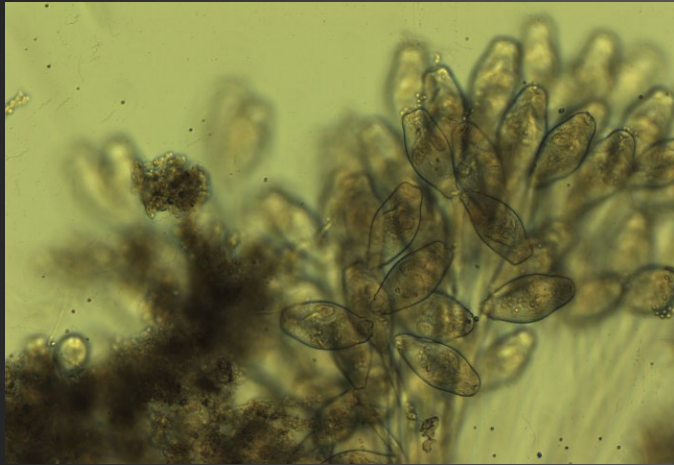


Highly technical equipment is now used for maximum Aeration efficiency.

# TIME TO MEET THE REAL WORKERS



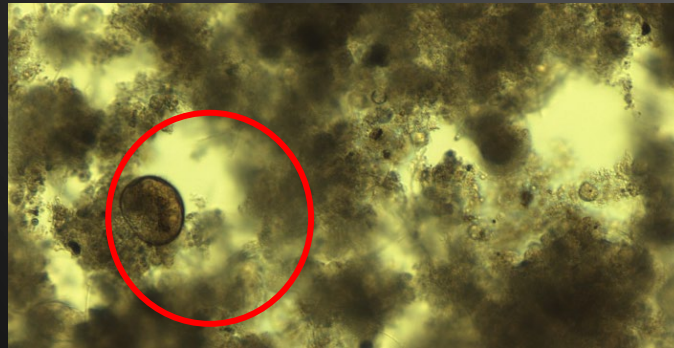
<https://imgflip.com/mememplate/86528146/Surprised-Look>



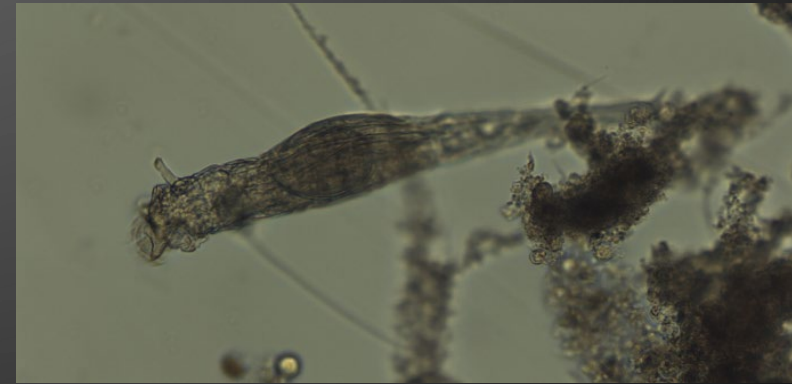
Stalked  
Ciliates



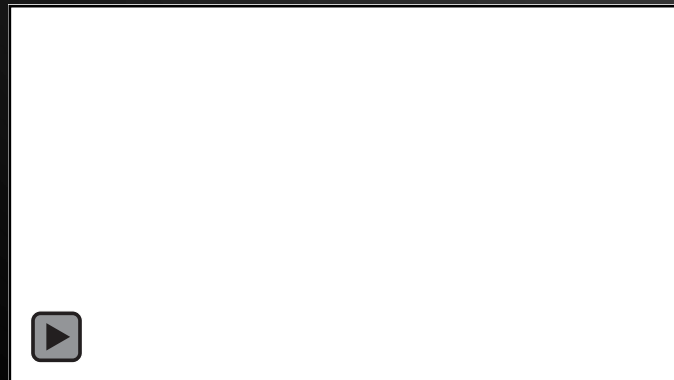
Crawling  
Ciliate



Amoeba



Rotifer



Stalked  
Ciliates



Water  
Bear

# WATER BEAR



Image credit: <http://dailycaller>

- \* Eight legs
- \* “Water Bear” / Tardigrade
- \* Claw-like hands/feet
- \* Can and do reproduce.



Female's shed molt

3 eggs (can lay up to 30 at a time)

Male Water Bears fertilize the eggs after they are shed.

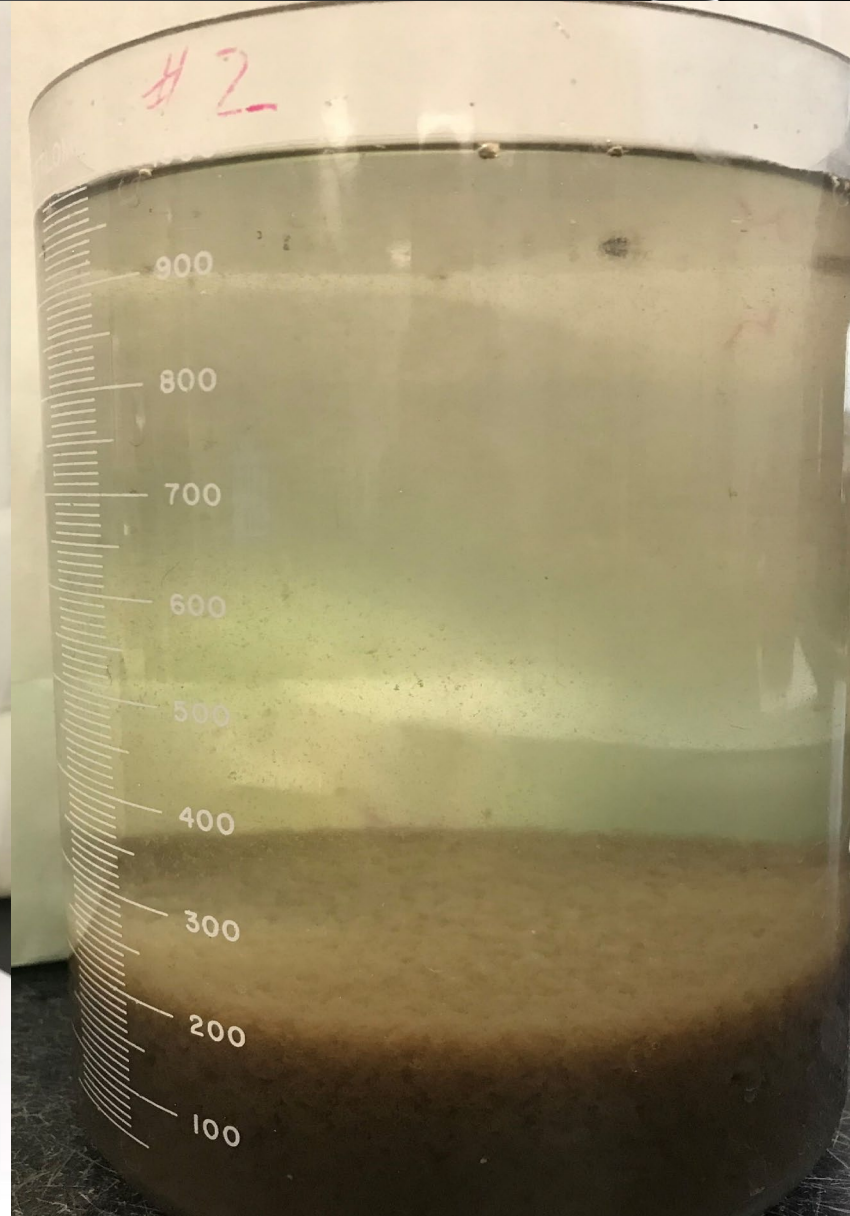
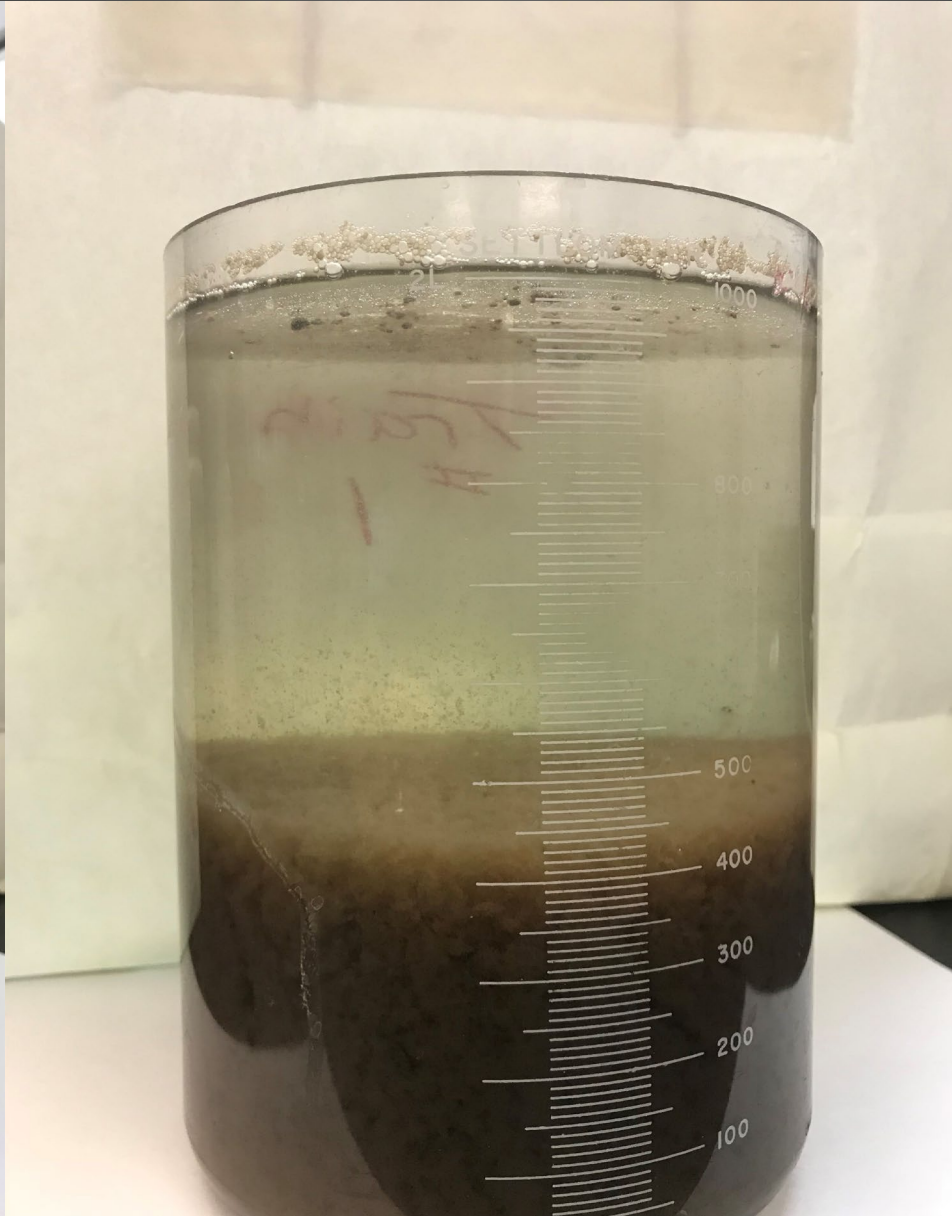
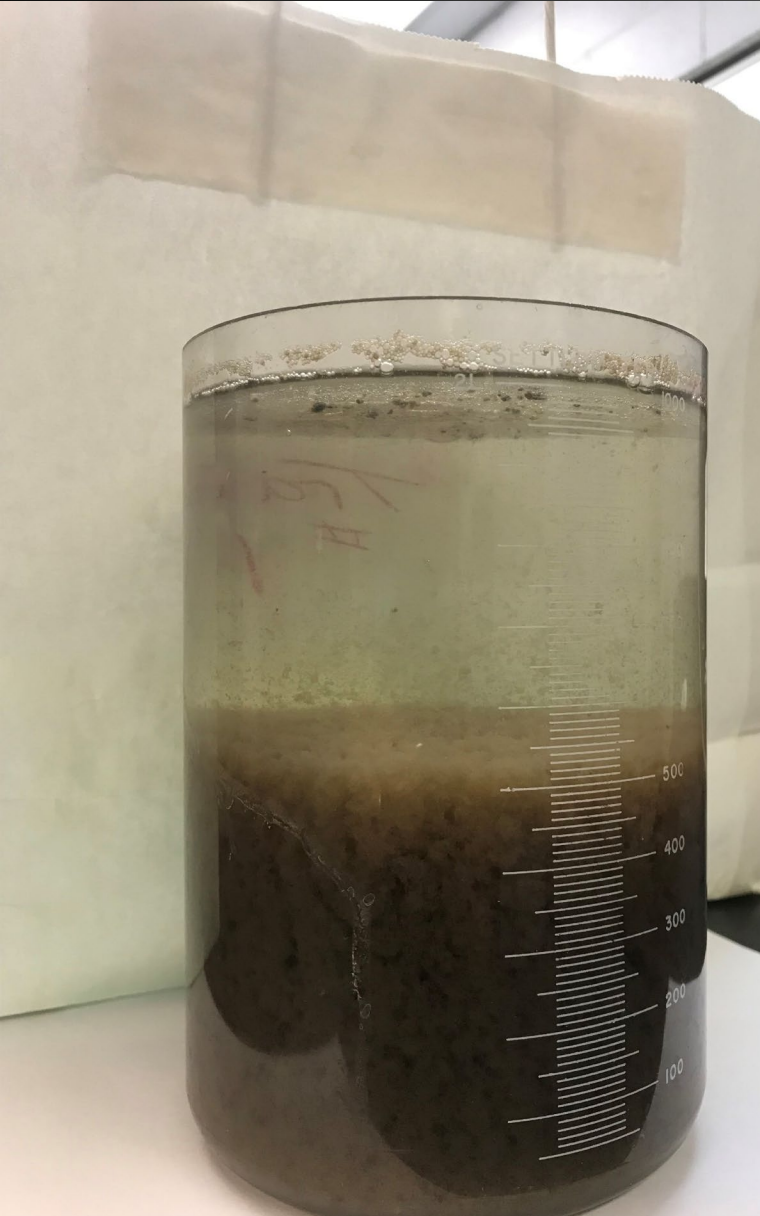
Image: Doug Engelsman

# *FINAL CLARIFICATION*

THE FLOW NOW GOES INTO CIRCULAR SETTLING TANKS. ALL OF THE MICROBES THAT CONSUMED THE NUTRIENTS SETTLE TO THE BOTTOM AND ARE RETURNED EITHER TO THE SECONDARY PROCESS OR THE SOLIDS HANDLING PROCESS. CLEAN, CLEAR WATER FLOWS OUT OF THESE TANKS OVER WEIRS AND INTO THE LAST STAGES OF TREATMENT.



# BUGS TO THE BOTTOM AND WATER TO THE TOP



- AFTER BIOSOLIDS ARE THICKENED, WE LAND APPLY TO
- NON-FOOD SOURCE CROPS TO UTILIZE THE STABILIZED RENEWABLE RESOURCE.



# UV DISINFECTION, AERATION AND DISCHARGE



Credit – Alibaba.com



# WHY IS WASTEWATER TREATMENT SO IMPORTANT !!!

Credit – wordpress.com



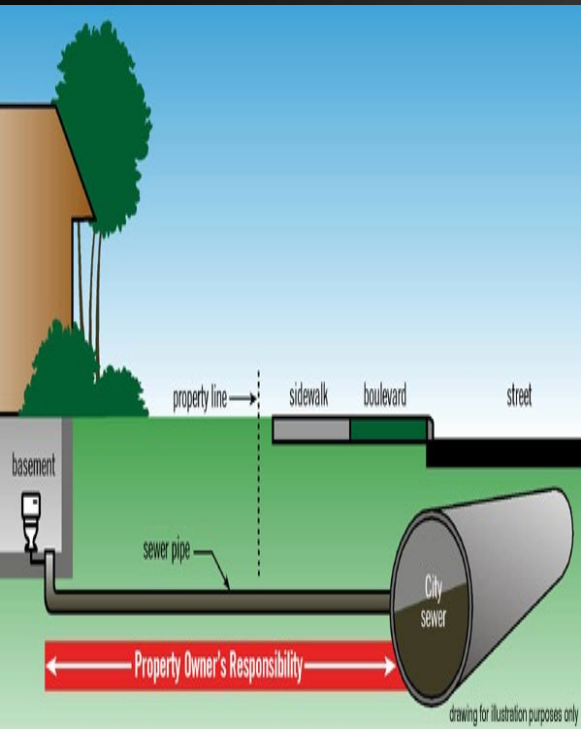
Credit-lake Michigan  
salmon fishing charter



Credit – wonderopolis.org

# WE HOPE YOU HAVE A BETTER UNDERSTANDING OF THE WASTEWATER TREATMENT PROCESS !!

TRANSMISSION



IPP (industry)



PLANT OPERATIONS



BIOSOLIDS

