

Waste to Energy & Pretreatment

Short's Brewing Co.

Speaker: Tyler Glaze

Short's Brewing Company - Overview

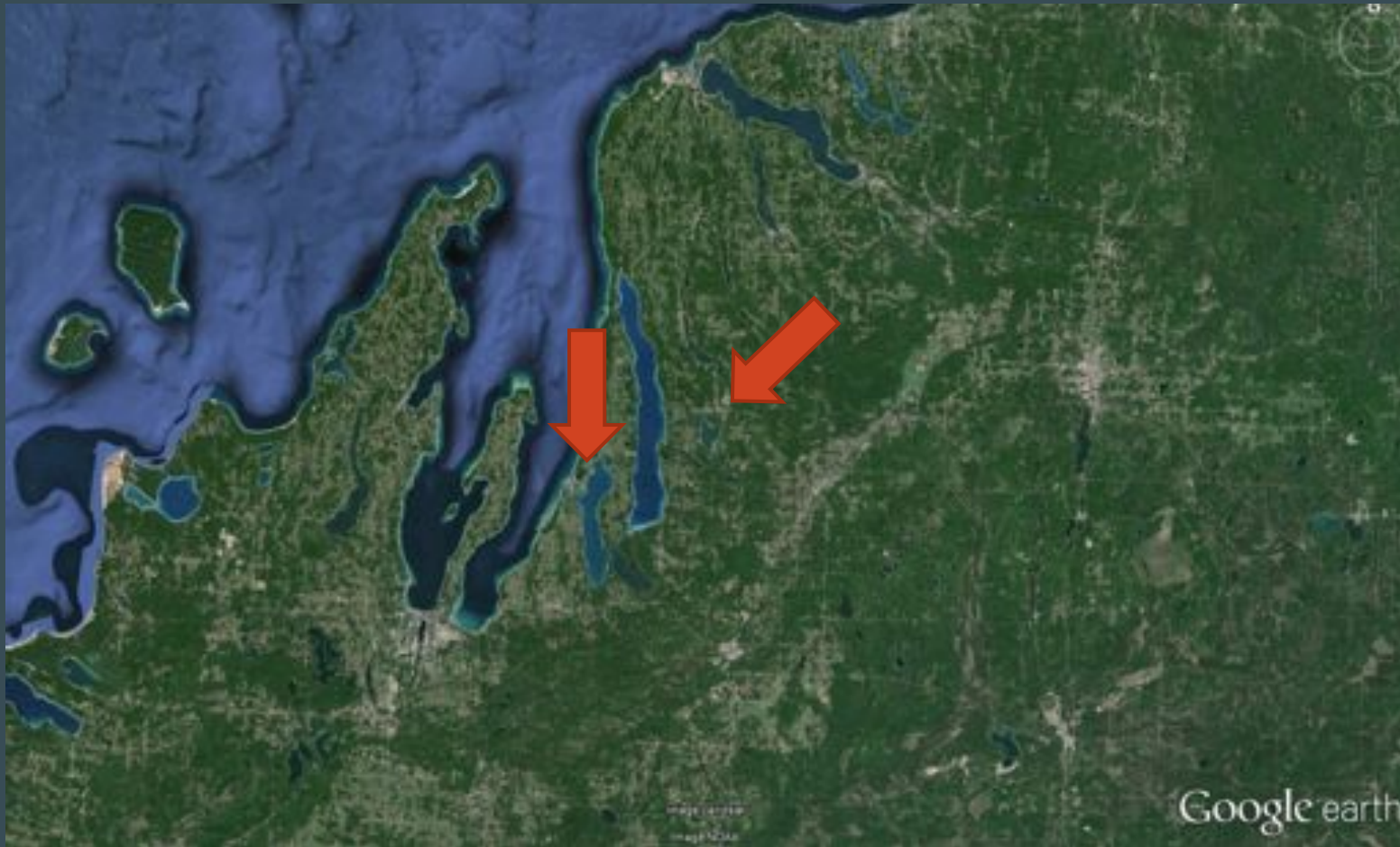
- ▶ Established in 2004
- ▶ Located in Northern Michigan
 - ▶ Bellaire, MI - 2004
 - ▶ Elk Rapids, MI - 2008/2009
- ▶ Sold in Michigan
- ▶ 32,000 bbl



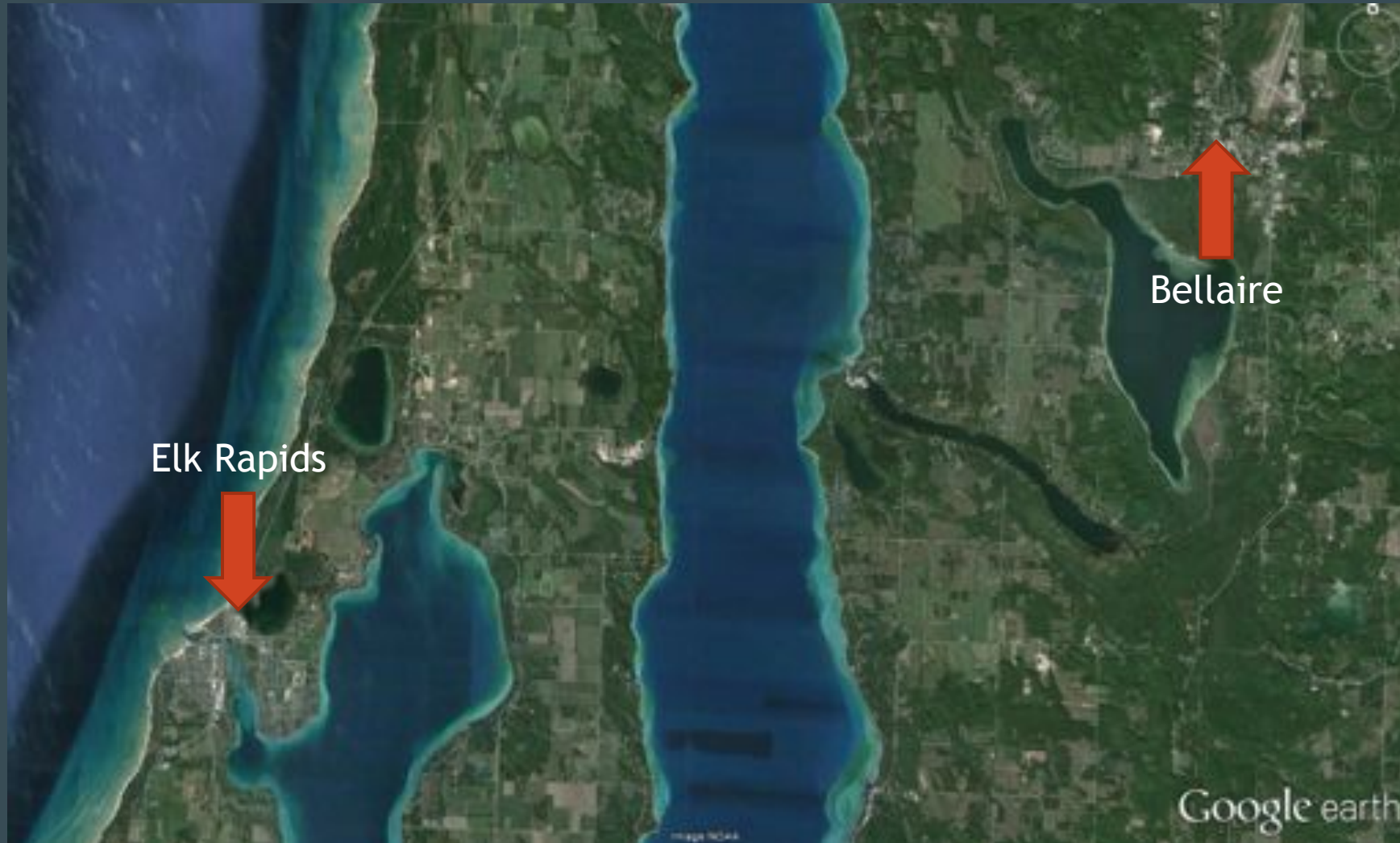
The Great Lakes & Short's



Northwestern Michigan



Antrim County, Michigan



Elk Rapids - Today's Focus



Elk Rapids Production Facility

- ▶ (1) 30 bbl brewhouse
- ▶ (28) 90 bbl tanks
- ▶ 4.7 acres land
- ▶ 1.7 brewery property
- ▶ 3.0 acres of storage units
 - ▶ Future brewery property
- ▶ New waste water treatment facility
- ▶ Side-streaming
- ▶ Offsite treatment



Our Dilemma - December 2011

- ▶ Village of Elk Rapids took control of their Waste Water Treatment Facility
 - ▶ Increased attention to detail
 - ▶ Heavy loading of the Village WWTP
 - ▶ Industrial users were assayed
- ▶ Short's was discovered to produce large amounts of BOD, Phosphorous, and TSS
 - ▶ We were approached to fix the issue ASAP or stop producing beer
 - ▶ Beer was too good to stop making
- ▶ So, we put our heads together and came up with a solution within 30 days

Breaking Down the Problem

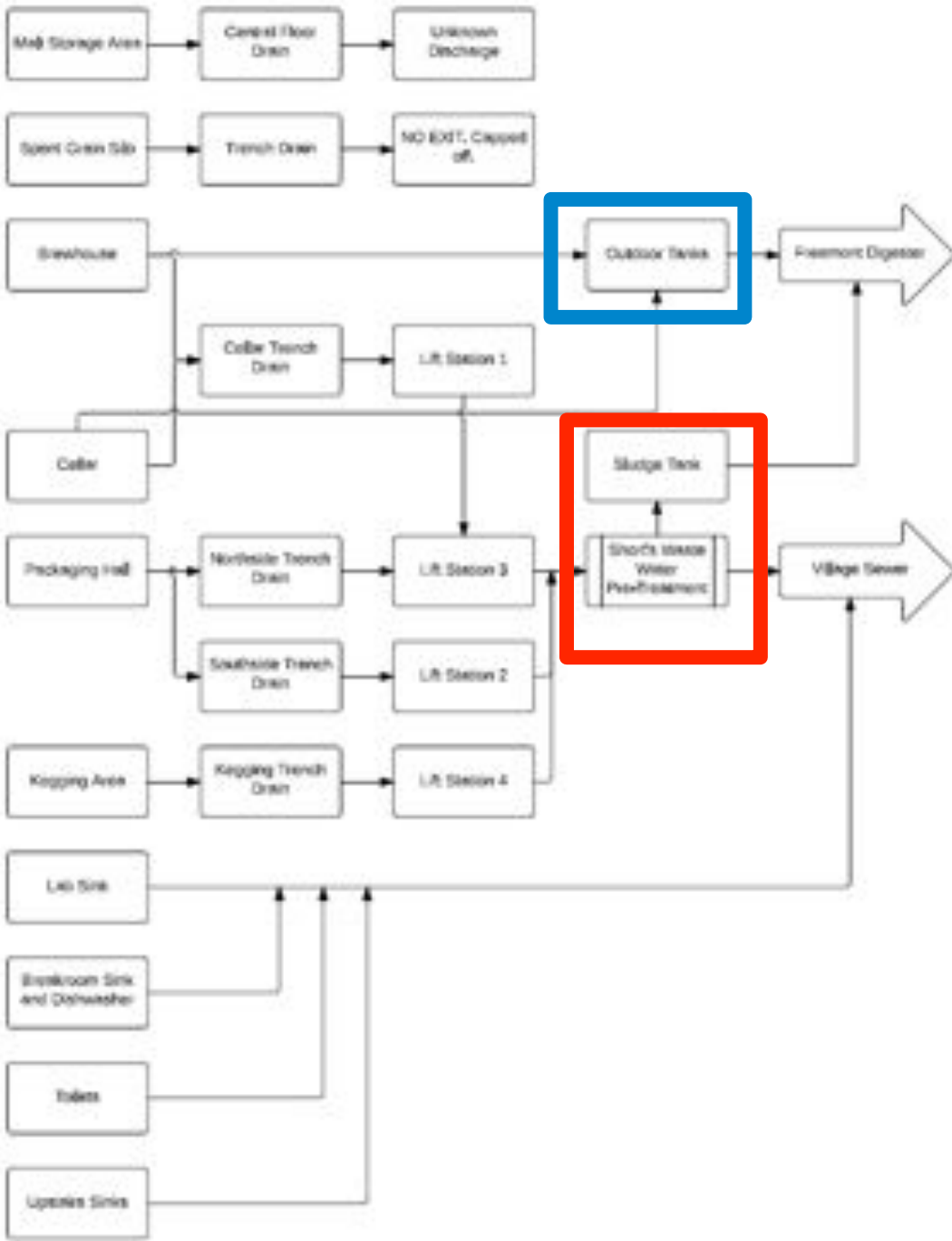
1. Identify our water consumption
2. Identify our volume of discharge
3. Identify our highest strength materials
 1. BOD, TSS, Phosphorous
4. Remove them from the waste stream
5. Find a responsible place to dispose of our waste
6. Drink a beer

Sampling Frequency

- ▶ DAILY SAMPLING - Village Ordinance
 - ▶ Strictly enforced
 - ▶ In capital letters for a reason
- ▶ Cost is extreme
- ▶ ~\$120,000/year is sampling costs
 - ▶ Incredible cost

Cost of treatment

- ▶ ~\$4000/month in charges billed from the Village of Elk Rapids
 - ▶ Things are starting to add up
 - ▶ Yes, sampling costs more than the treatment for Short's...



A brief flowchart...

That slide had to go...

Finding the Culprits

- ▶ Area Velocity Flow Meter (AVFM) - Linked to Municipal Radio
 - ▶ 7,000-10,000 gallons per day in Dec. 2011
- ▶ HACH SD900 Water Sampler
 - ▶ Installed during new construction upstream of the AVFM
 - ▶ Uses relays tied to the pumps to determine when to sample our effluent
- ▶ Combining the AVFM data and the SD900's water sampler results we can get weights of the BOD, TSS, and Phos.
 - ▶ These weights are used to determine the load that Short's created for the Village WWTP

Finding the Culprits

- ▶ Made incremental changes to our process to reduce our loading and watched the lab data that returned
 - ▶ Two week turn around on lab data.

Action	TSS	BOD	Phos.
Isolated tank bottoms into an open fermenter	++	-	+
Diverted brewhouse weak worts and trub	+	++	+
Diverted ALL brewhouse and cellar waste water	++	++	+
Diverted keg packaging waste water	-	-	-
Diverted bottle packaging waste water	-	-	-

Choosing a Solution

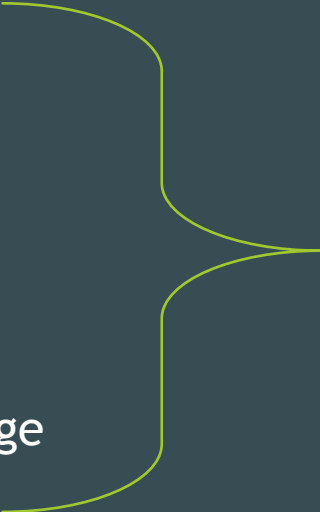
- ▶ The Breakdown:
 - ▶ Option 1: UWD - Deemed to be environmentally irresponsible
 - ▶ Option 2: S - Crazy expensive, waste of energy, waste of lots of stuff
 - ▶ Option 3: OMT - Expensive transportation costs & expensive treatment costs
 - ▶ Option 4: P - Anaerobic digester
 - ▶ NOVI energy and Freemont Community Digester - The only choice

Why Anaerobic Digestion with Fremont?

- ▶ Side-streamed product
 - ▶ High Concentration - Hard to treat ourselves
 - ▶ Low Volume - Easy to transport
- ▶ Not treating the waste was in our best interest
- ▶ We needed an immediate, low cost solution
- ▶ Local
 - ▶ We are in a relatively remote area of Northern Michigan
- ▶ Ethanol distilleries unavailable

What are we side-streaming?

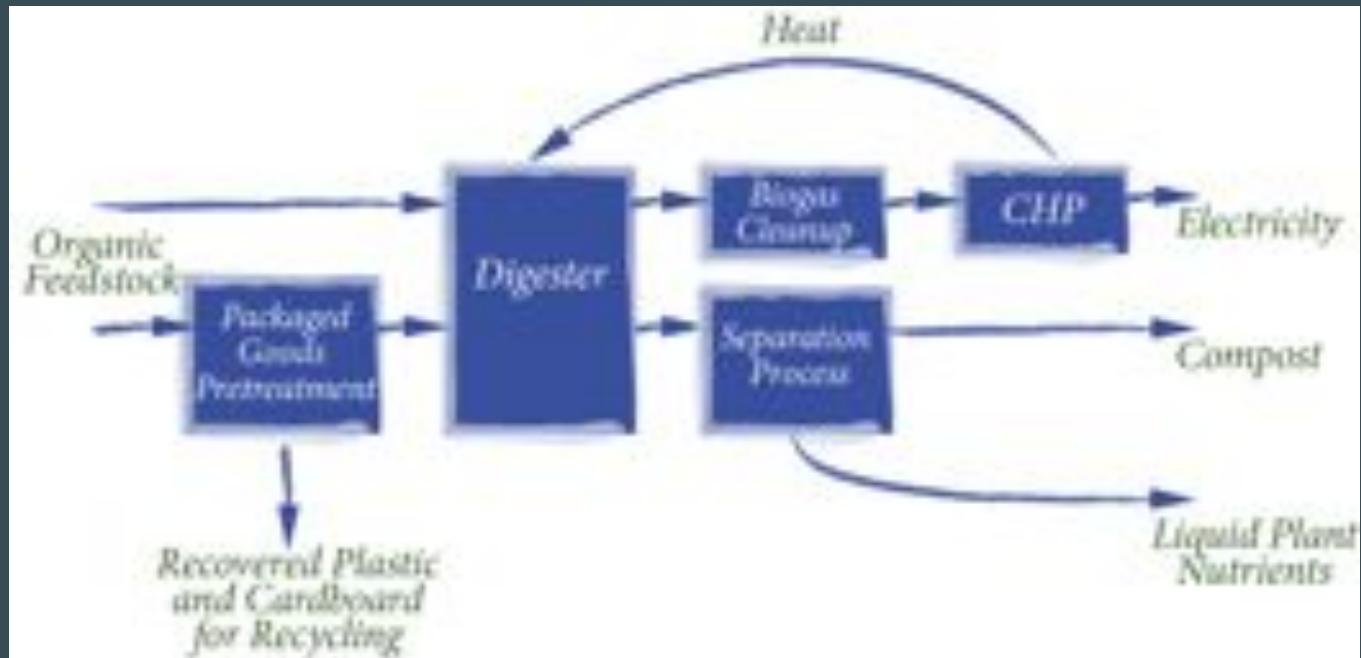
- ▶ Tank Bottoms
- ▶ Weak worts
- ▶ Trub
- ▶ Spent grain runoff
- ▶ Waste yeast from our centrifuge



10000 gal/wk
Accounted for 70% of our BOD
Allowed and planning period

Fremont

NOVI
ENERGY



Problem solved....

Fast Forward Two Years

To December 2013

Low Strength Overload (Dec 2013)

- ▶ Our low strength waste has increased in volume and now was impacting the Village's system once again.
- ▶ Village of Elk Rapids began designing their new WWTP
- ▶ We wanted to handle the waste ourselves
- ▶ Our capacity was set to increase in the summer with addition of new filling line
- ▶ Our volume sent to the city was going to increase
- ▶ We needed to come up with a complete solution...

A Complete Solution

- ▶ Trucking our waste to Novi is not a complete solution
 - ▶ Our high strength low volume waste is trucked out
 - ▶ Our low strength high volume waste is not
 - ▶ We wanted to treat this waste for various reasons
- ▶ We decided to build a waste water pretreatment facility
 - ▶ Footprint available at the time was small
 - ▶ Used past two years of data collection to categorize our waste
 - ▶ Effectively removes us from the system

Design Parameters

Loading	BOD	TSS	Phosphorous	Volume
Influent (current)	398 lb/day	531 mg/L	25 mg/L	6890 gpd
Design Capacity	1500 lb/day	1840 mg/L	-	45,000 gpd
Effluent Quality	9 mg/L	10 mg/L	10mg/L	-



- Safe
- Easy to operate
- Quiet
- Redundant
- Relatively odor free
- Expandable
- 60' L x 60' W x 35' H

The Proposal (Dec 2013)

- ▶ Aerobic Treatment System
 - ▶ Membrane Bio-Reactor (MBR)
 - ▶ Dissolved Air Flotation (DAF)
 - ▶ Aeration and Equalization Tanks
 - ▶ Permeate reuse tanks
- ▶ Why Aerobic?
 - ▶ Smaller footprint
 - ▶ More stable
 - ▶ Expandable
 - ▶ Provided greater level of treatment
 - ▶ Virtually removes our impact on the Village of Elk Rapids WWTP

x Tyler Glaze

Construction



Construction

Continues...



Expected Online 11/15/2014

Cross your fingers...