Water Conservation at Bailey Nurseries

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Introduction

- About to start last semester at University of Wisconsin-Madison

- Engineering student with focus on water resources

Bailey Background

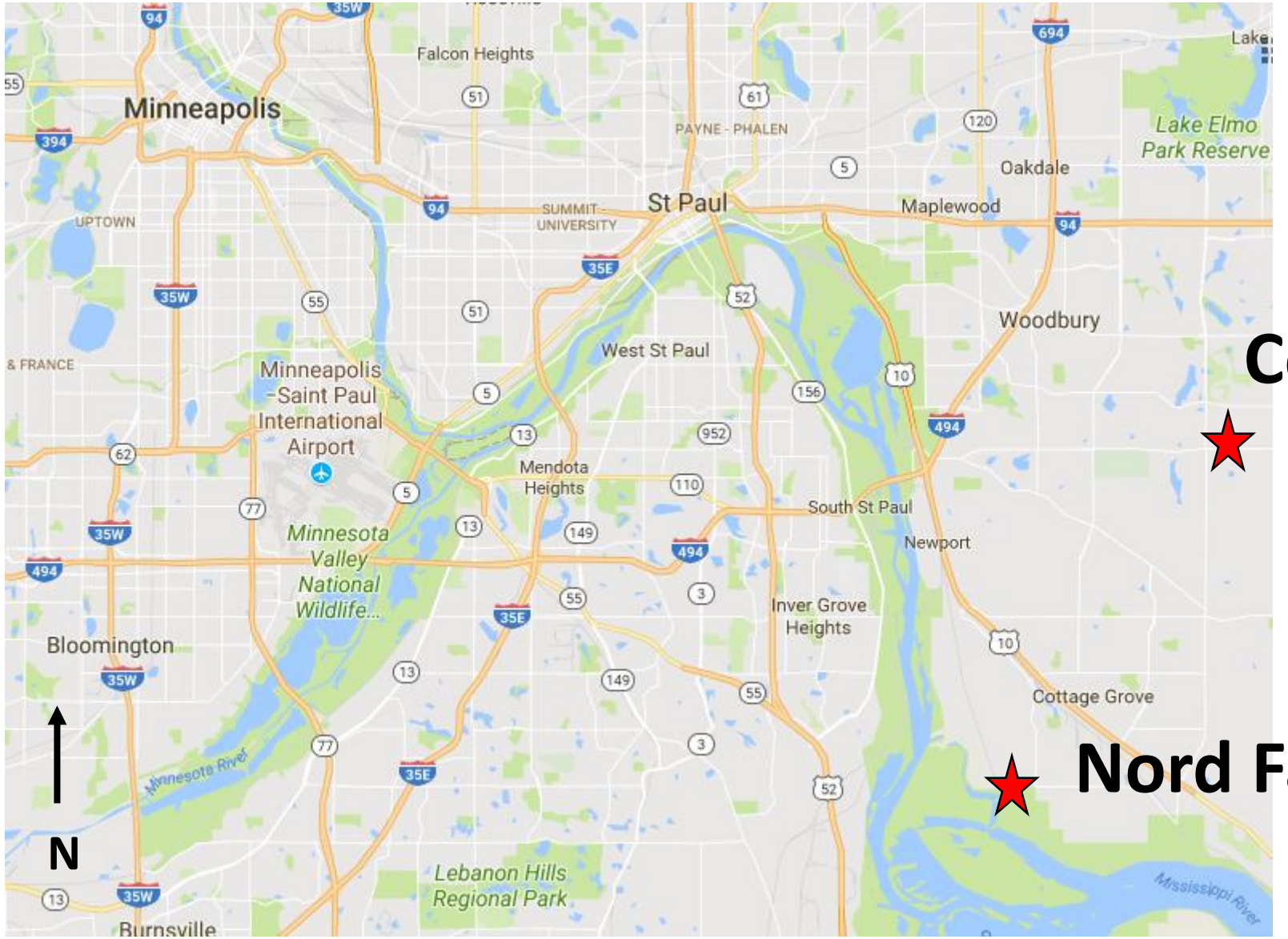
- Large whole sale plant nursery

- Farms in Minnesota, Illinois, Washington, Oregon, and Georgia

BAILEY NURSERIES®

Nord Farm: Recycling Water for Irrigation

Container East: Optimizing Irrigation


Minneapolis
Falcon Heights
PAYNE - PHALEN
St Paul
SUMMIT-UNIVERSITY
UPTOWN
Maplewood
Oakdale
Lake Elmo Park Reserve
Woodbury
West St Paul
Minneapolis-Saint Paul International Airport
Mendota Heights
South St Paul
Newport
Minnesota Valley National Wildlife...
Inver Grove Heights
Bloomington
Cottage Grove
Minnesota River
Lebanon Hills Regional Park
Mississippi River
Burnsville
N
Container East
Nord Farm

Why Change?

- Located in North and East Groundwater Management Area

- Identified as a large groundwater user


Nord Farm

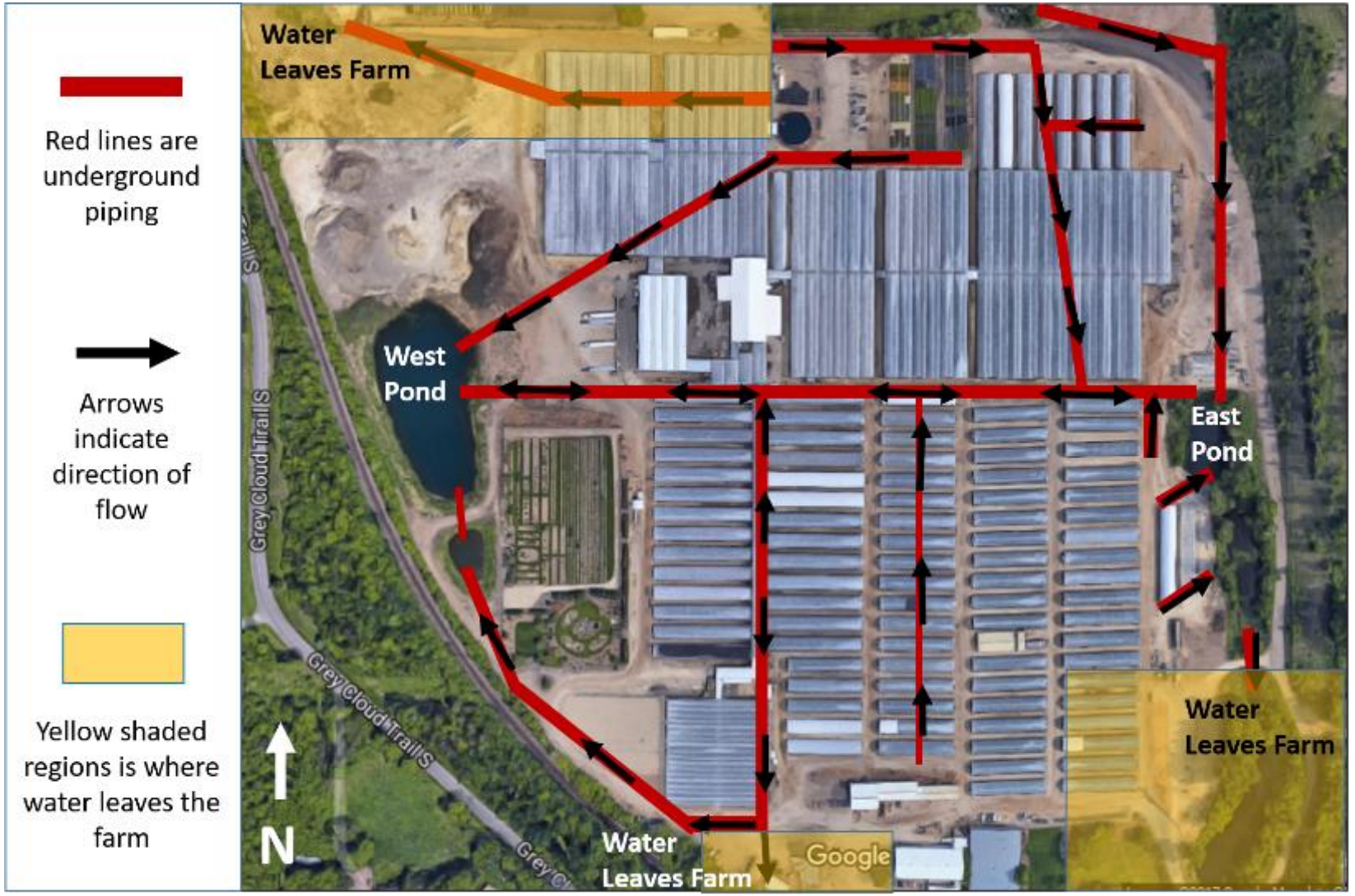
Goal: Reduce amount of groundwater used for irrigation by utilizing pond water

Background

- 54 million gallons consumed in 2016
- Pump from west pond
  - 6.5 million gallons

Irrigation

- Greenhouses connected by drainage tiles
- Seedbeds drain to East pond



Rainfall

- Water ends up in drain or pond
- Gutters on greenhouses send it directly to pipes

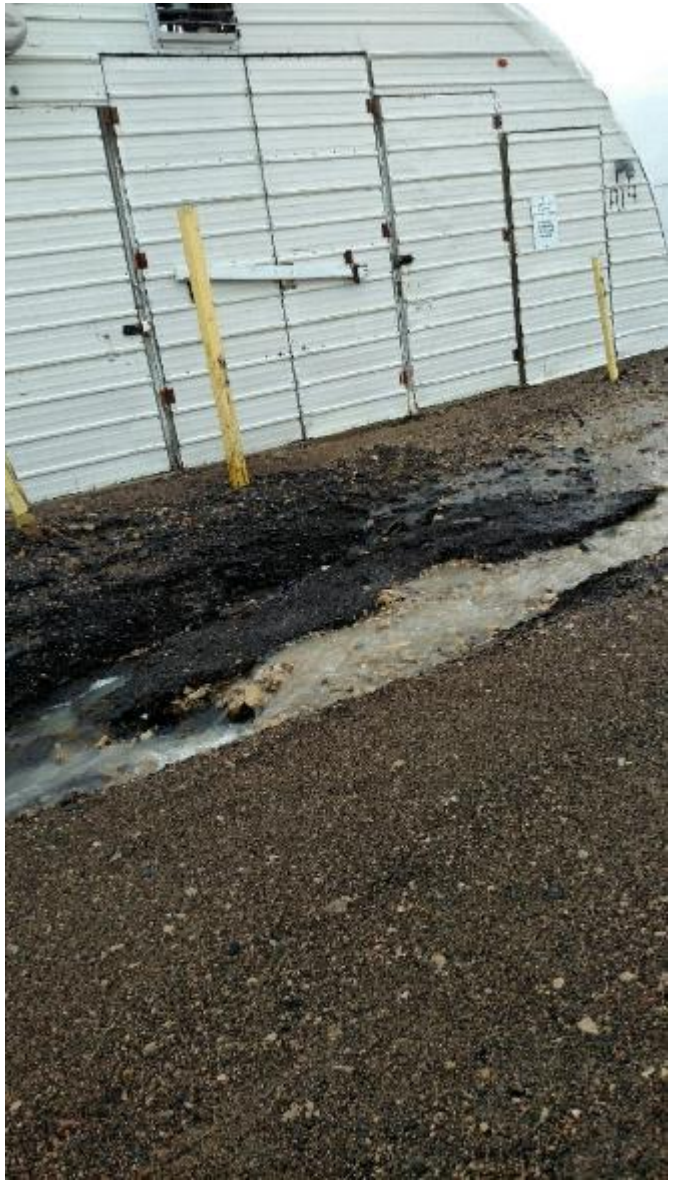
Rainfall in the Seedbeds

- 75% drains to the East pond

Reducing Sediment in Pipes

- Prevent and remove sediment in pipes

- Drainage berm will reroute the rainfall away from problem area



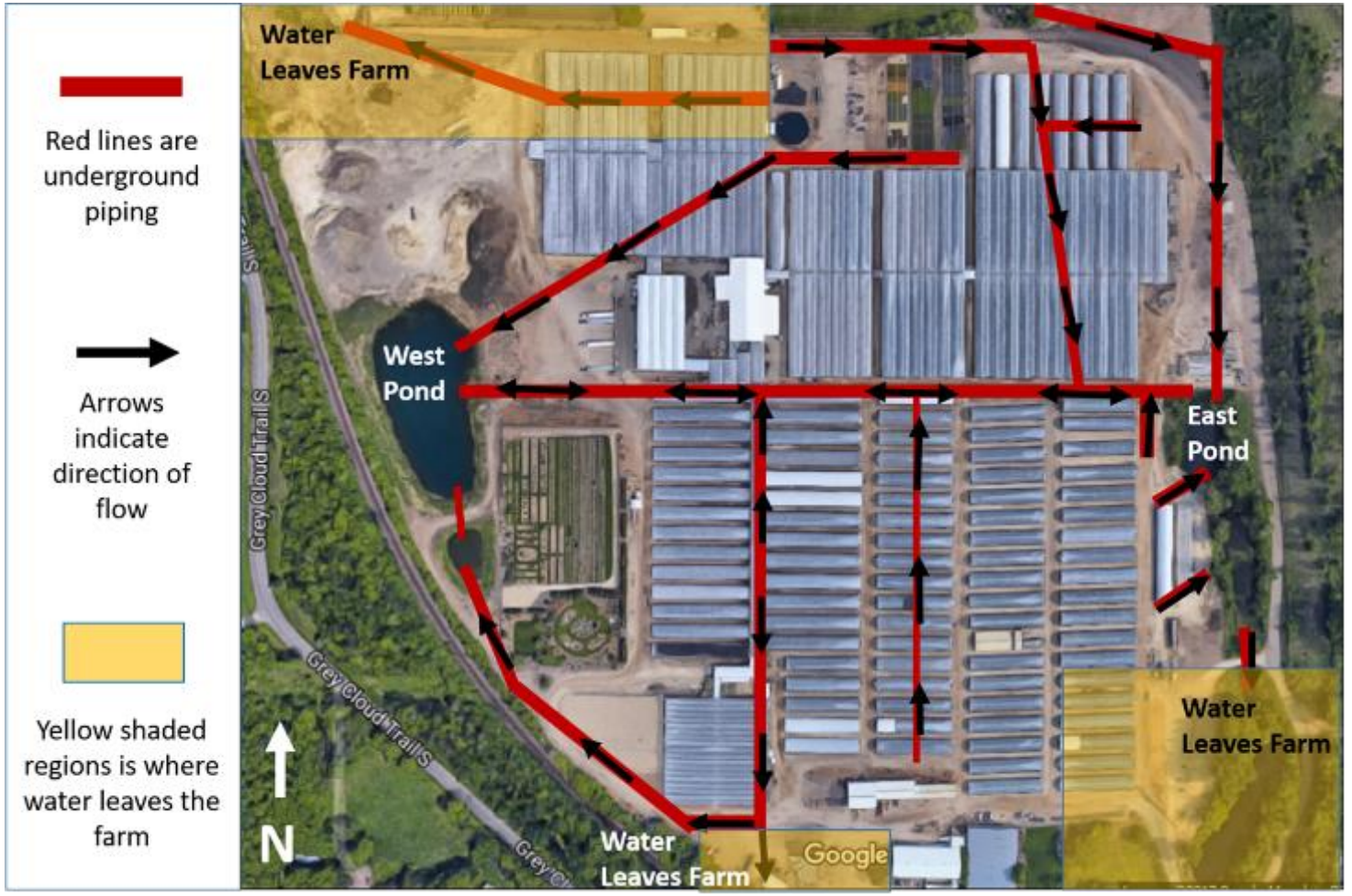
Drainage Berm

- Directs water towards East Pond
- Reduces sediment and rock in pipes

New Drainage Berm at Work

Water Conveyance to West Pond

- Gate prevents backflow into East pond
- Becomes settling pond for water from seedbeds
- Water is pumped into pipe connecting East and West ponds



Water Availability from Different Areas Around Nord

Greenhouses

- 85% of rainwater is recoverable
- 22 million gallons of water available/year

Seedbeds

- 35% of rain and irrigation water is recoverable
- 10 million gallons of water available/year

Roads, Buildings, etc

- 55% of rainwater is recoverable
- 21 million gallons of water available/year

System Components

System Components

Circulates water in pond

Reduces algae

System Components

500 GPM

Pumped through pipe at bottom of pond

System Components

Sand filtration

50 microns

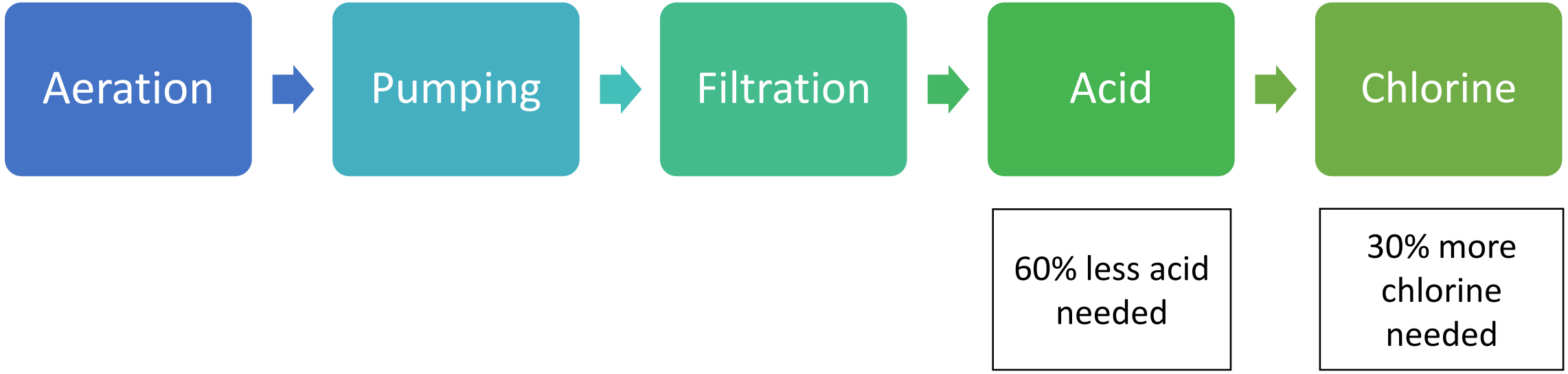
System Components

Lowers pH of pond so treatment is effective

System Components

Kills pathogens harmful to plants

System Components

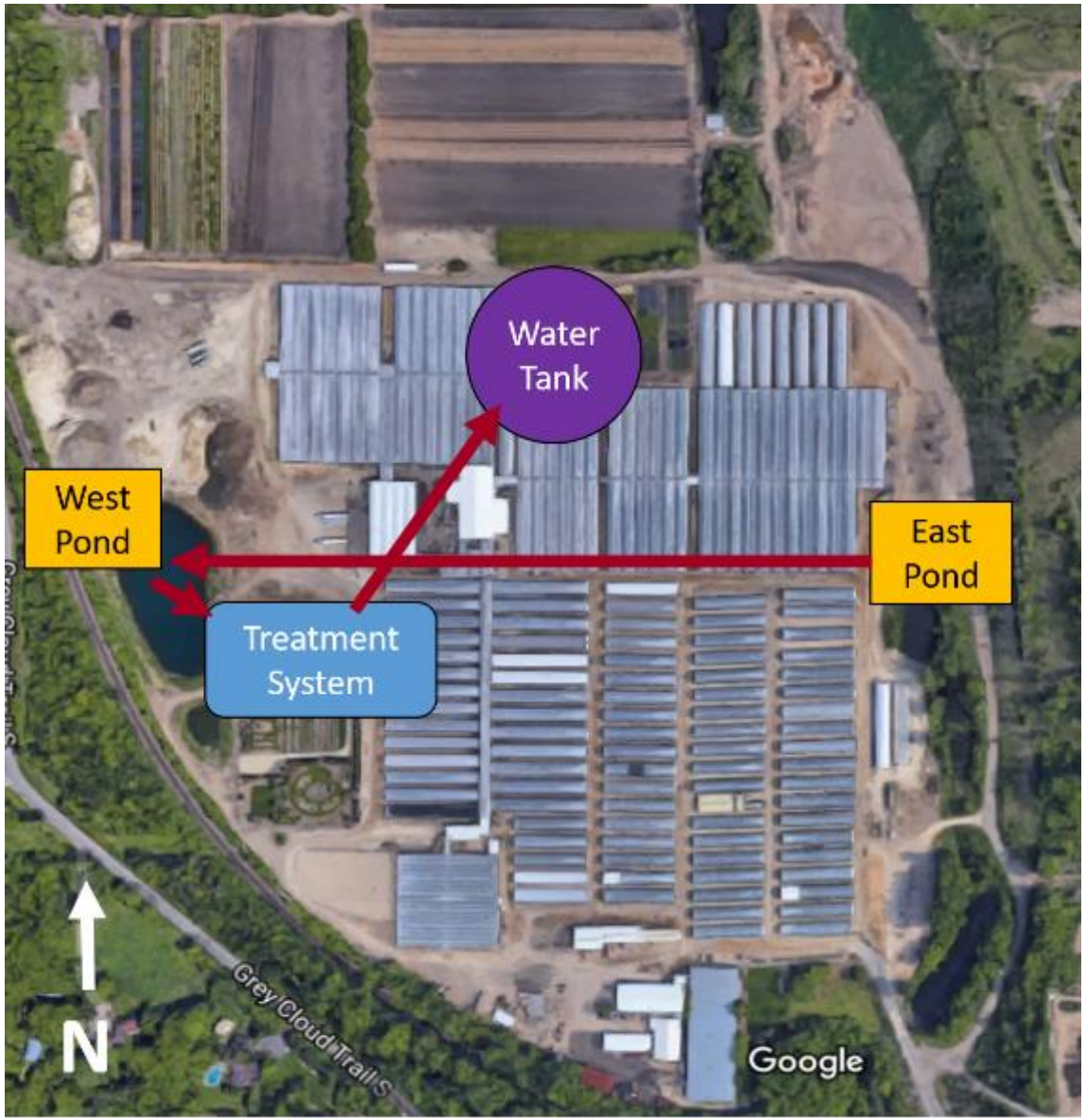


= $10,000 savings/year

Piping

- Underground to first greenhouse
- Sent through Production to holding tank

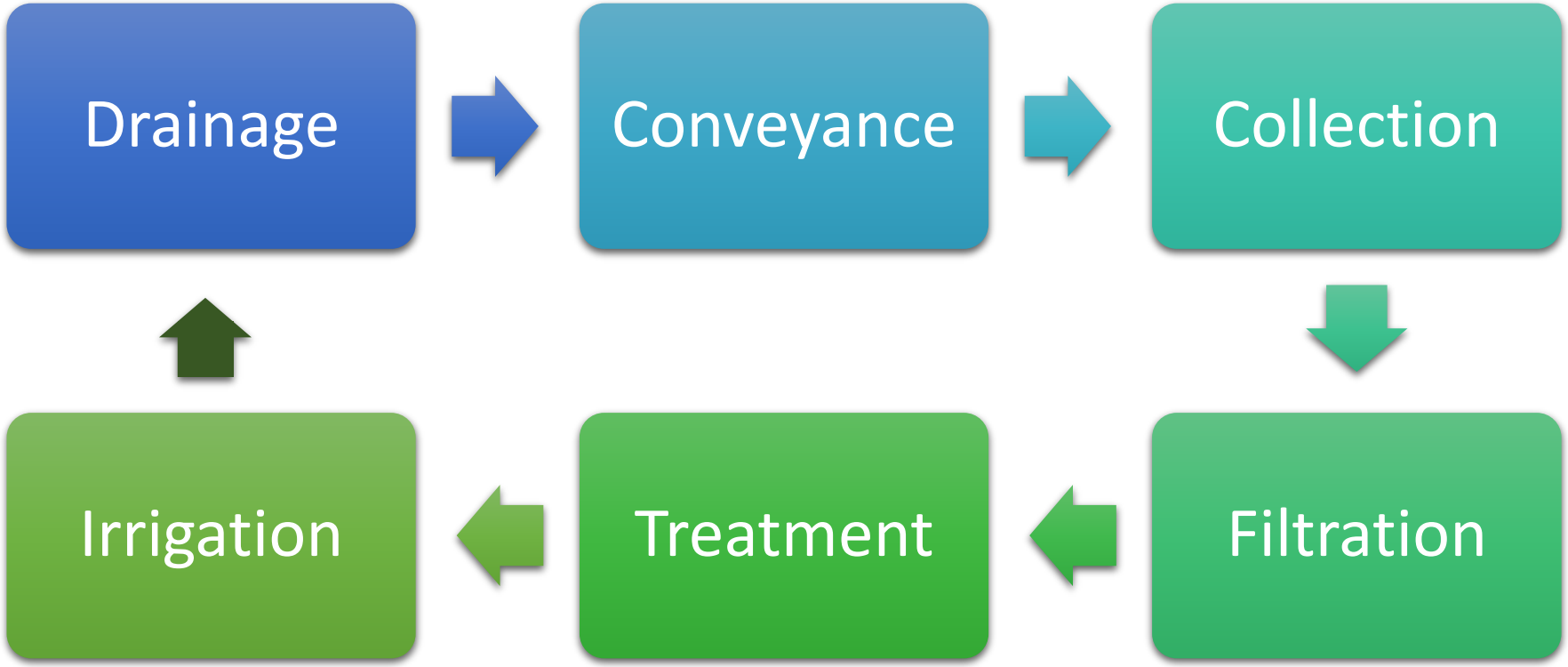
Schematic Diagram of the Process the Water will Undergo



Quotes for Each Component of System

Components	Cost	Notes
Water Quality	$55,000	Aeration, clean drains
Pump + Piping	$55,000	Pump, piping, VFD
Electric Connection	$44,000	Getting power out to pond
Treatment	$46,000	Filters, acid, chlorine, flow meter
East Pond	$4,000	Pump, electric
Total Cost	**$204,000**	**Dependent on final quote decisions**

Water Savings = 38 million gallons



Container East Farm

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Recommendations

Trial	Result	Ideal	Recommendation
Water Holding Capacity	28%	45-65%	Change substrate to have higher water capacity
Plant Available Water	44%	> 25%	No Change
Sprinkler Irrigation Uniformity	84%	> 80%	No Change
Irrigation Capture Factor	Cones = 98%	< 100%	Might need to water more
	Roses = 112%	> 100%	Might be able to water less
Leaching Fraction	1 gallon = 29%	10-15%	Can water less frequently
	2 gallon = 10%	10-15%	Might need to water more

Potential Savings

- 10 million gallons
- More if further steps are taken

Conclusion

- Annual water savings of **38 million** gallons at Nord Farm

- **10 million** gallons at Container East

Personal Benefits

- Gather data from a variety of places
- Independent and team work

Special Thanks To:

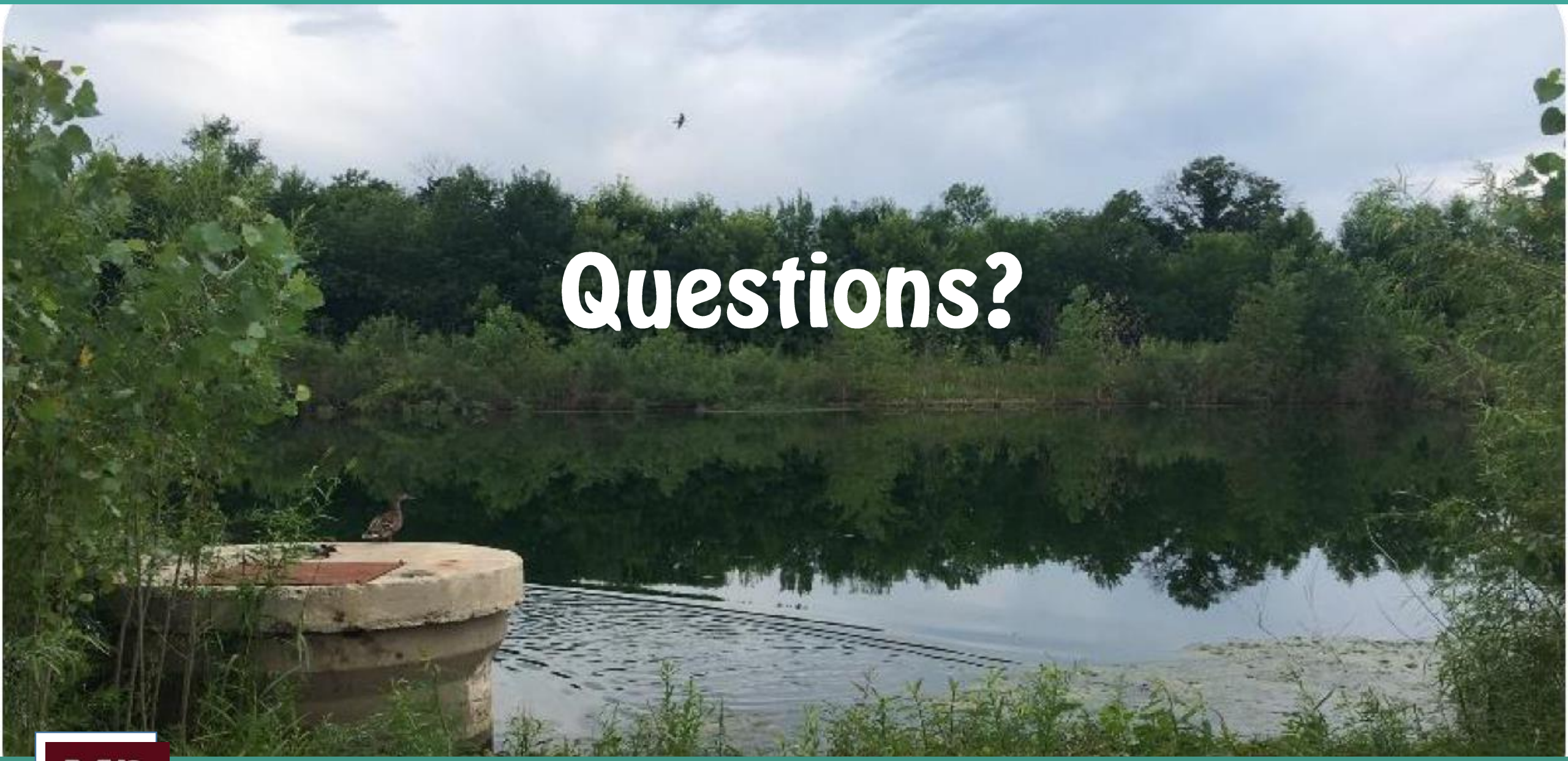
Laura Erickson

Dave Gross

Mike Hoffman

Doug Schute

Jean-Marc Versolato


Questions?