### Modeling the Reconfiguration of the Albert Lea Wastewater Treatment Plant

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#### **City of Albert Lea Wastewater Treatment Plant (WWTP)**

#### • Domestic and Industrial Water Treatment

- Serves a population of 18,203
- Built 1980-82, \$34 million
- Food processing, metal plating, a biodiesel plant, an ethanol plant, and truck washing.
- Treated 9.5 million lb. of Biological Oxygen Demand (BOD), 123,000 lb. of ammonia, and 132,000 lb. of Phosphorous in 2019





### Why do we treat wastewater?

- •Solids, Grease and Oils
- •Biological Oxygen Demand
- •Toxins
- Pathogens
- •<u>Nutrients</u>





















Wastewater





































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- Primary Treatment
- Secondary Treatment
- Nitrification
- Post-Treatment
- Solids Management



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#### M<u>n</u> TAP

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## **The Importance of Nutrient Removal**

#### Eutrophication

- •7,000 sq. mile dead zone in Gulf of Mexico
- •31% of Phosphorous in the Mississippi is from WWTPs
- Local impacts on recreational use and fish populations
  Expected permit limits





#### The Computer Modeling Approach **Baseline Modeling** Lisflars Brasler Secondary Inflared Fraslinsalias 4.375 1.37 Inflared COOD Inflored Values 02 Selpaial Discolard 02 and AValue \$12,3345 laws-de/Valance 4.975 Inflored TSS ---- 02 ..... 02 34.53125 and COD 24.12 and COD 24.12

- Matching Current Conditions
- Nitrogen Tracing
- •Metals Testing
- **Improvement Modeling** 
  - •Three Reactor System
  - •Optimize



Redirected RAS Line





### **Primary Recommendation**

#### **Plant Reconfiguration**

- •Turn aeration off in secondary basins
- •Install mixers in secondary clarifiers
- •Redirect RAS to head of secondary aeration
- •Switch to 400hp blower



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Expected permit would require...



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Plant upgrade estimated to cost as much as \$30 million



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Chemical addition estimated to cost \$153,000 per year



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Recommendation	Annual Reduction	Total cost	Annual savings	Payback period	Status
Modeled Plant Reconfiguration	79,000 lbs. P 300,000 lbs. N 1,300,000 kWh		\$98,000		Recommended



#### Anecdote



