

Nutrient Removal at the West Lafayette WWTP

Dave Henderson, Utility Director



Current Conditions

- ❖ 9.0 MGD Design Average Daily Flow
- ❖ Conventional Activated Sludge Plant
- ❖ Last major expansion in the mid-1990's



Imagery Date: Feb 28, 2005

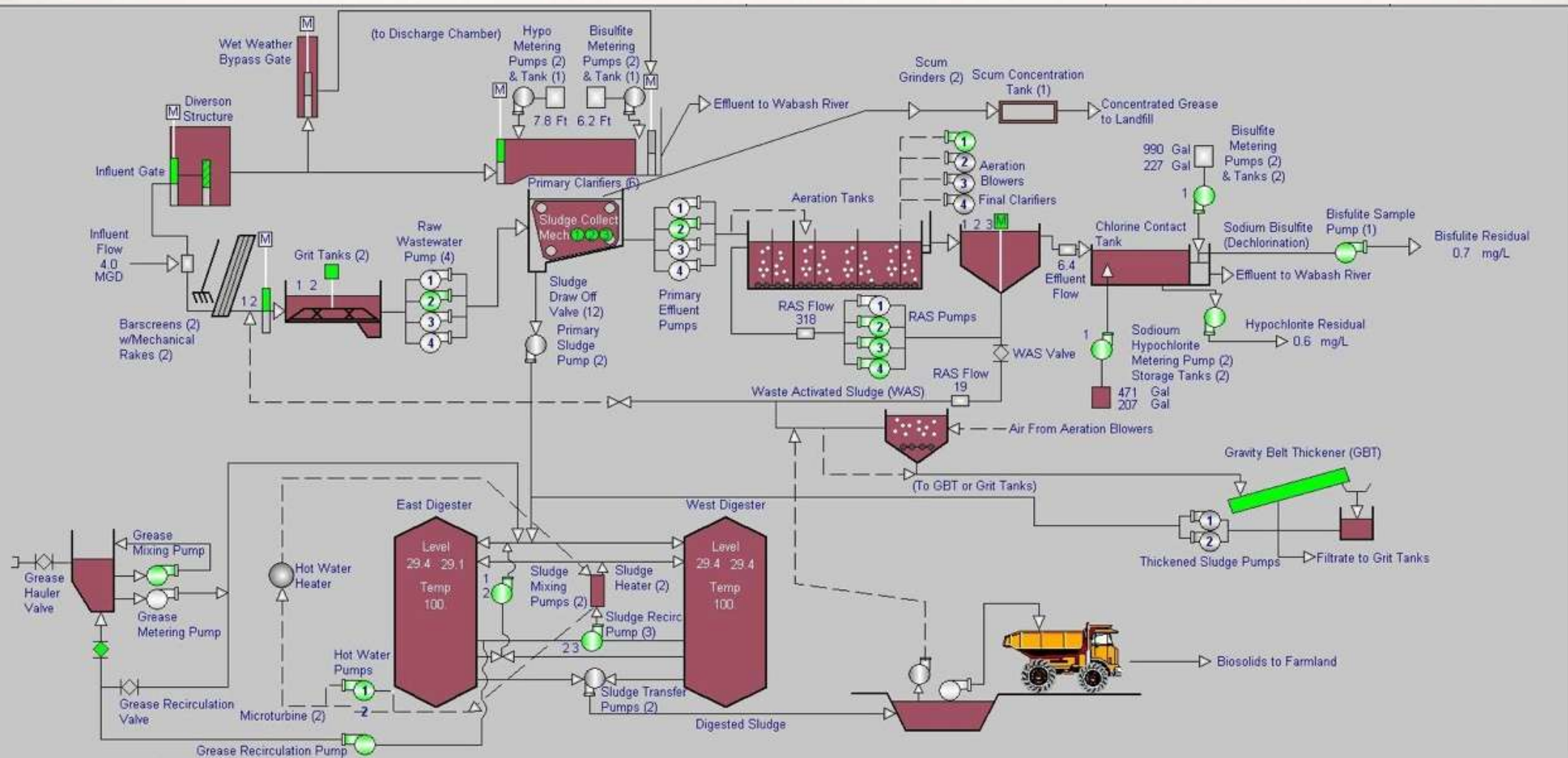
40°25'01.14" N 86°54'11.01" W elev 159 m

© 2010 Google
Image IndianaMap Framework Data

©2009 Google

Eye alt 8.17 m

Process Overview



NPDES Permit Limits

- ❖ Ammonia-Nitrogen

	Monthly Average	Weekly Average	Units
Summer	3,755	6,008	lbs/day
Winter	4,506	6,759	lbs/day
Summer	3.0	4.5	mg/L
Winter	6.0	9.0	mg/L

Draft NPDES Permit

- ❖ New Phosphorus Monitoring Requirement
- ❖ Recommended in the Wabash River TMDL Development Final Report.
- ❖ TMDL is based on WWTPs meeting a 1 mg/L Phosphorus limit.

Capacity Study Completed

- ❖ 20 year plan options have been identified.
- ❖ Phosphorus and nitrogen limits may be in the NPDES permit within that timeframe.
- ❖ Upgrade roadmap includes bite-size “chunks”.
- ❖ How best to position the Utility for the future ????

Yes, I know it's cliché, but a paradigm shift is underway. . .

- ❖ Insinkerator Food Waste Symposium in Chicago
- ❖ Lauren Fillmore, Water Environment Research Foundation.
- ❖ George Tchobanoglous, Professor Emeritus University of California, Davis



WERF's Technology Roadmap for Sustainable Wastewater Treatment Plants in a Carbon-Constrained World

- ❖ Wastewater is a source of nutrients, energy, and water.
- ❖ Focus needs to be on resource recovery as much as meeting current treatment objectives.
- ❖ Wastewater treatment rebranded as water reclamation and resource recovery.

West Lafayette Shifting Gears

- ❖ Already captures methane from anaerobic digesters to produce electricity.
- ❖ Concentrate on maximizing anaerobic process.
- ❖ Reduce energy demand and increase energy production.



Back to the Future!

Primary treatment and anaerobic digestion

- ❖ Capacity improvement options:
 - ❖ Extend primary clarifiers
 - ❖ Chemically Enhanced Primary Treatment (Brad Musick)
 - ❖ Fine Screening of Primary Effluent (George Tchobanoglous)



Is this Mr. Fusion ????

Chemically Enhanced Primary Treatment

- ❖ Addition of aluminum or iron salts at Primary Influent Wet Well.
- ❖ Polymer addition may also be needed to aid in settling.
- ❖ Capture more BOD, TSS, and Phosphorus in the primary sludge.
- ❖ Reduced loading to aeration tanks.

Hmmmm, More Sludge ?

Is that a good thing ?

- ❖ Many anaerobic digesters have excess capacity. Better mixing helps.
- ❖ Digested biosolids are applied to farm land to reuse the nutrients we recover.
- ❖ Possibly generate energy from dried biosolids.

Secondary Treatment Thoughts

- ❖ Replace centrifugal blower with turbo blower.
- ❖ Add a selector zone to the aeration basin .
- ❖ Add capability for mixed liquor recycle.

Combined Sewers

- ❖ Monitoring ammonia at Wet Weather Treatment Facility.
- ❖ Nutrient limits for CSO treatment facilities in the future?
- ❖ What is the best way to recover all the resources flowing to us?

Thank You for Listening!



❖ Questions ????