



TACWA Meeting March 2021

# **Sewage Sludge to Biosolids: A Century of Biosolids Management**

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Clean Water Strategies

Austin, Texas

March 19, 2021



# Acknowledgements

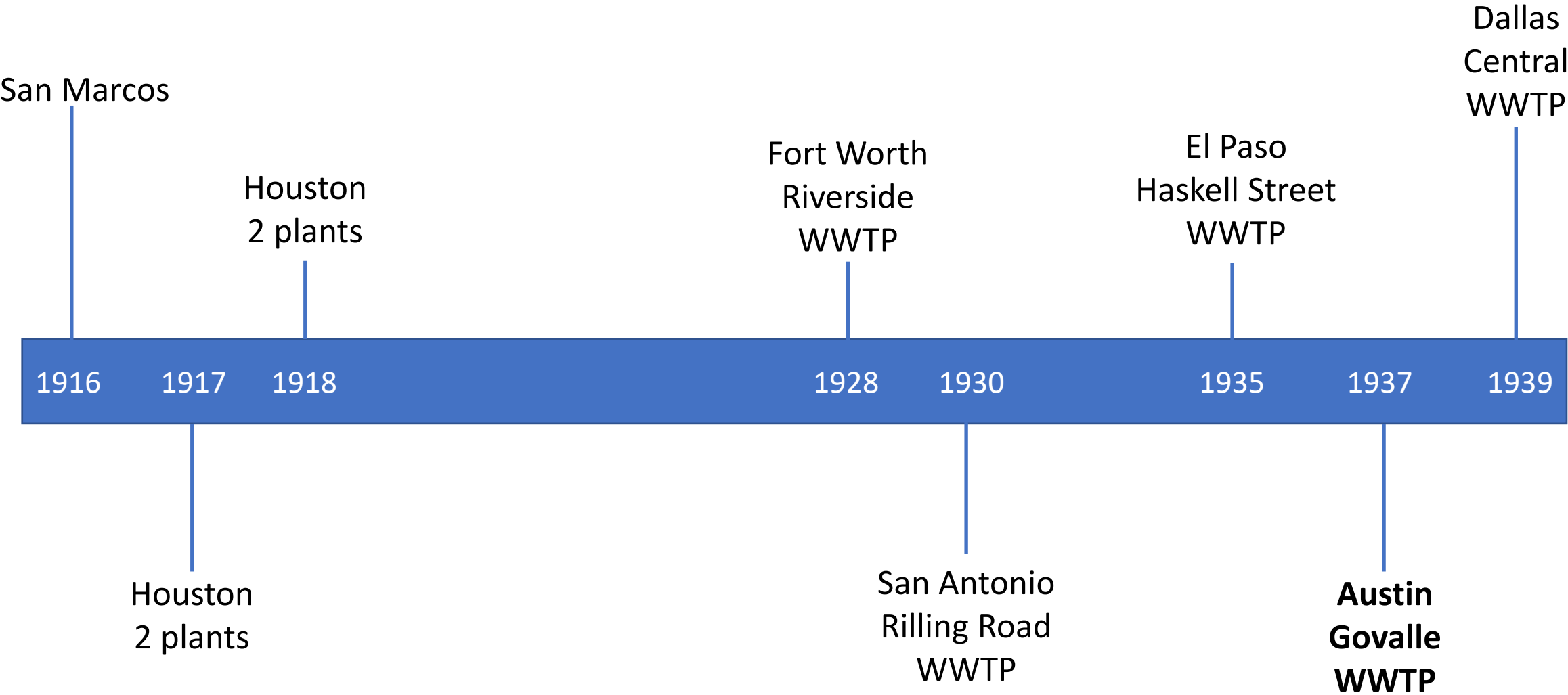
- Austin Water – Lisa Boatman, Dr. Kevin Anderson, Jody Slagle, Jim Doersam
- Austin History Center
- TCEQ – David Galindo, Louis C. Herrin, III
- EPA – Robert Bastian
- UT Austin – The Late Dr. Joseph F. Malina, Jr.
- Freese and Nichols – Dr. Leonard E. Ripley
- Water Environment Association of Texas
- Water Environment Federation
- The Water Research Foundation

# Early Days In Austin

- Sketchy information on wastewater collection and treatment
- Septic Tanks
- Collection System
- Imhoff Tank at Canterbury Street until 1937
- Sludge → Sludge Drying Beds → Agricultural Use
- If drying beds were full, sludge discharged to the Colorado River



# Early Activated Sludge Plants in Texas





**Govalle Wastewater Treatment Plant (May 15, 1937 – October 4, 2006)**



# Govalle Wastewater Treatment Plant

- 1934 – Under the New Deal, Public Works Administration approved \$500,000 grant and loan for the Plant
- Design Population 125,000
- 31-acre site
- 1935 – Construction started
- 1937 – Plant operation started, May 15
- 4 Anaerobic Digesters (2+2) – Later converted to sludge holding tanks
- Digested Sludge → Sludge Drying Beds → Agricultural Use
- If drying beds were full, sludge discharged to the Colorado River



# Hornsby Bend Sludge Disposal Ponds

- City of Austin's remote sludge storage and disposal plant
- City acquired 270 acres in mid-1950s
- Three lagoons to receive sludge:
  - Pond 1 – 85 acres
  - Pond 2 – 65 acres
  - Pond 3 – 35 acres





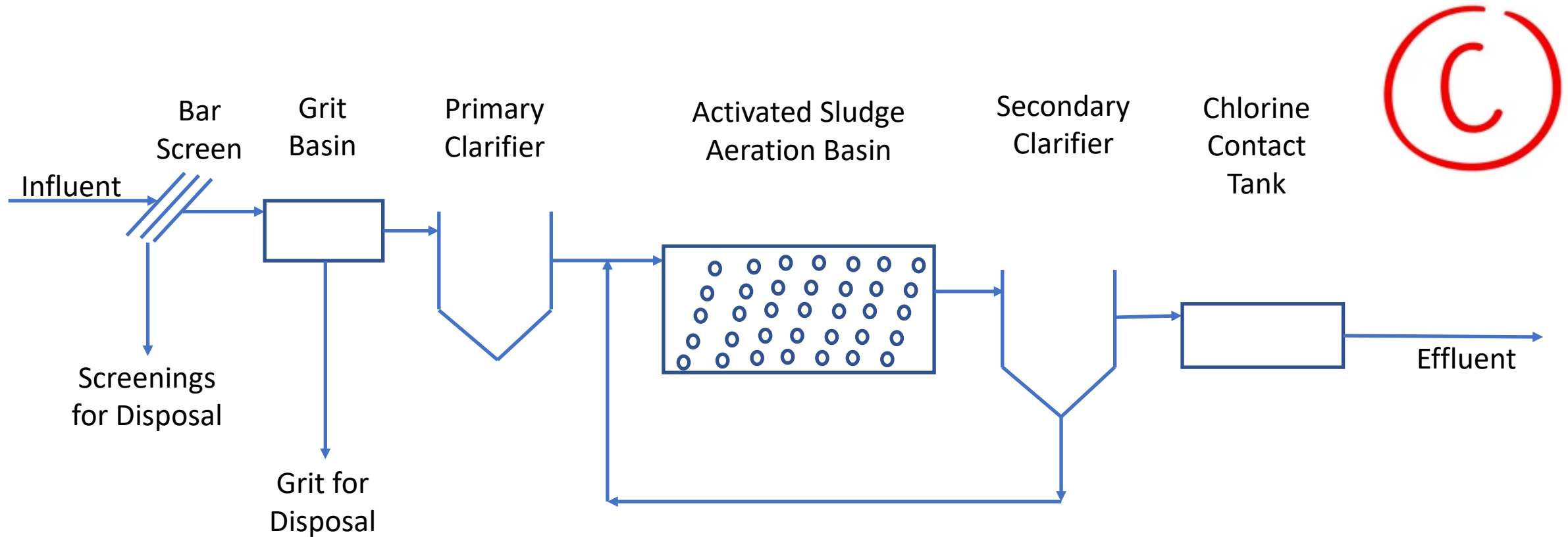
# Hornsby Bend Ponds

- Earlier no discharge
- As the volume of sludge grew, discharge was necessary
- Later permitted as a waste stabilization pond system
- Discharge Permit limits: 30 mg/l BOD<sub>5</sub> and 90 mg/l TSS
- Initially smaller population, lower loading – met permit limits
- Lagooning was one of the acceptable method of sludge disposal
- Initially designed as “Sludge Oxidation Lakes”

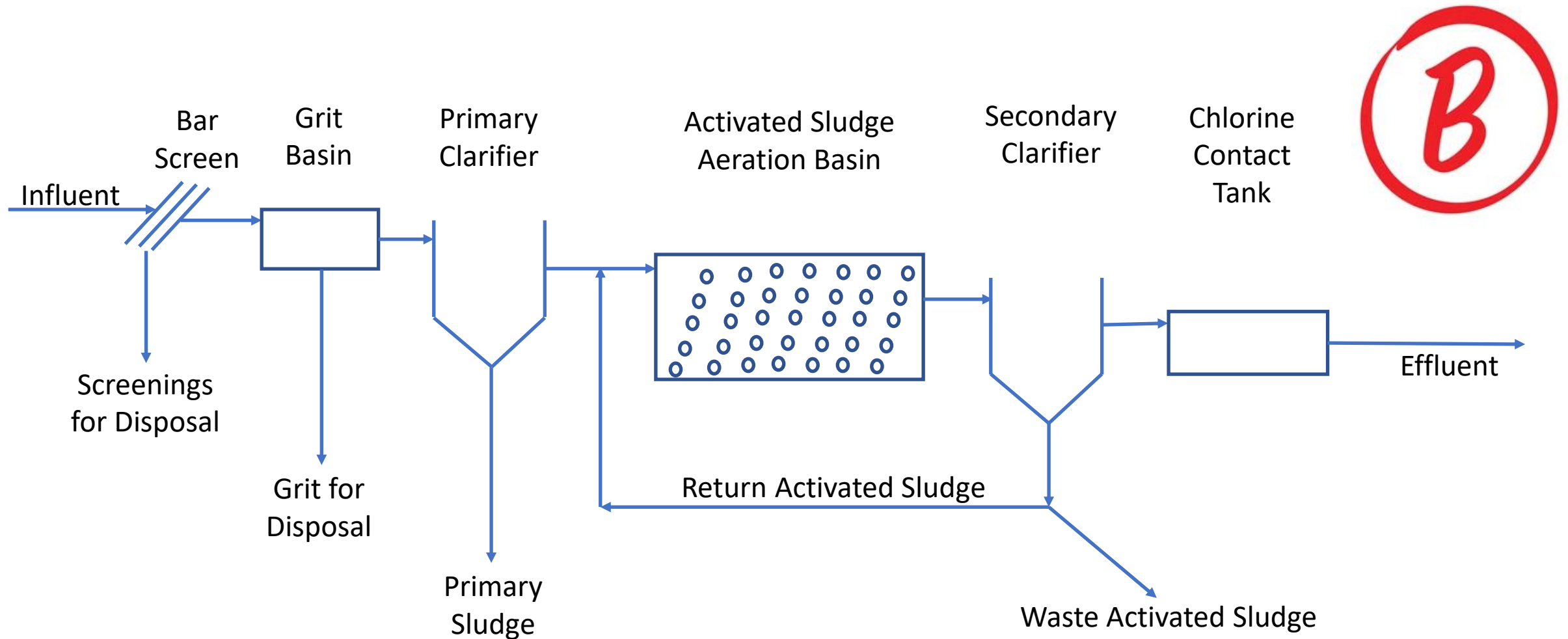




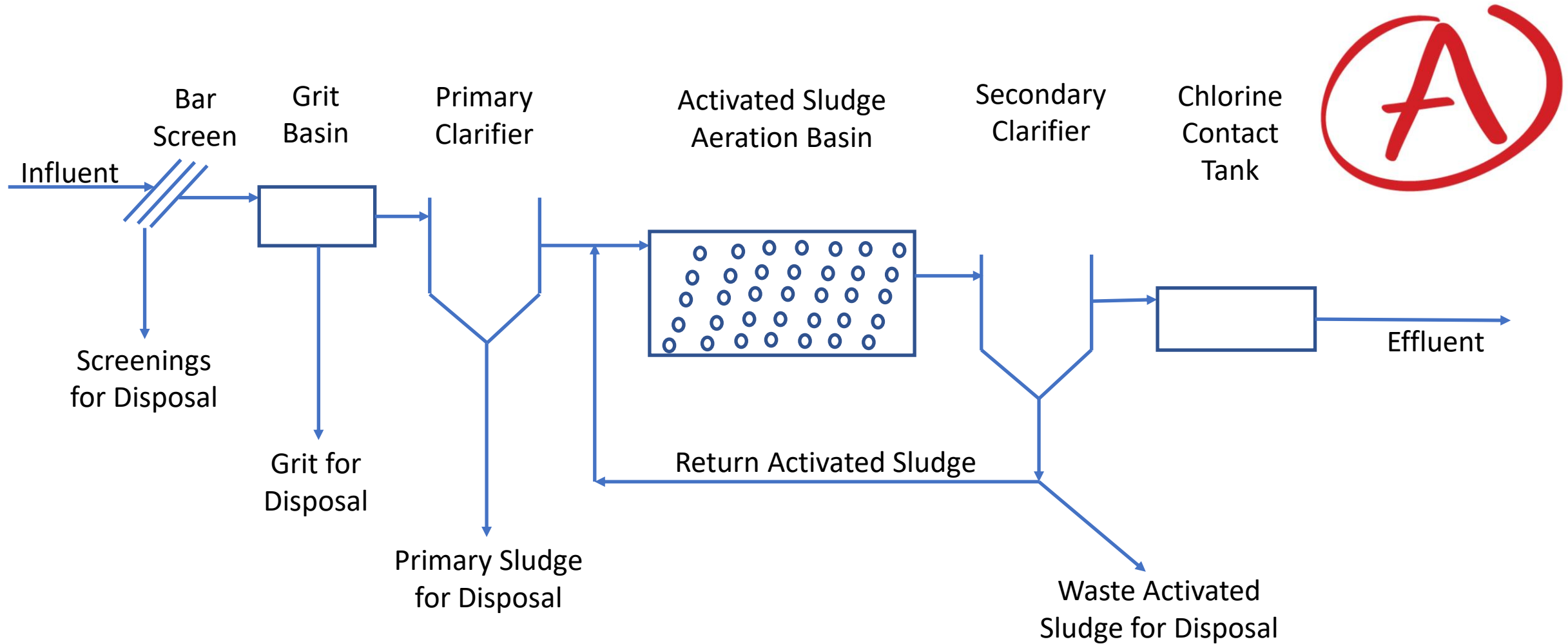
# Wastewater Treatment Plant Schematic



# Wastewater Treatment Plant Schematic

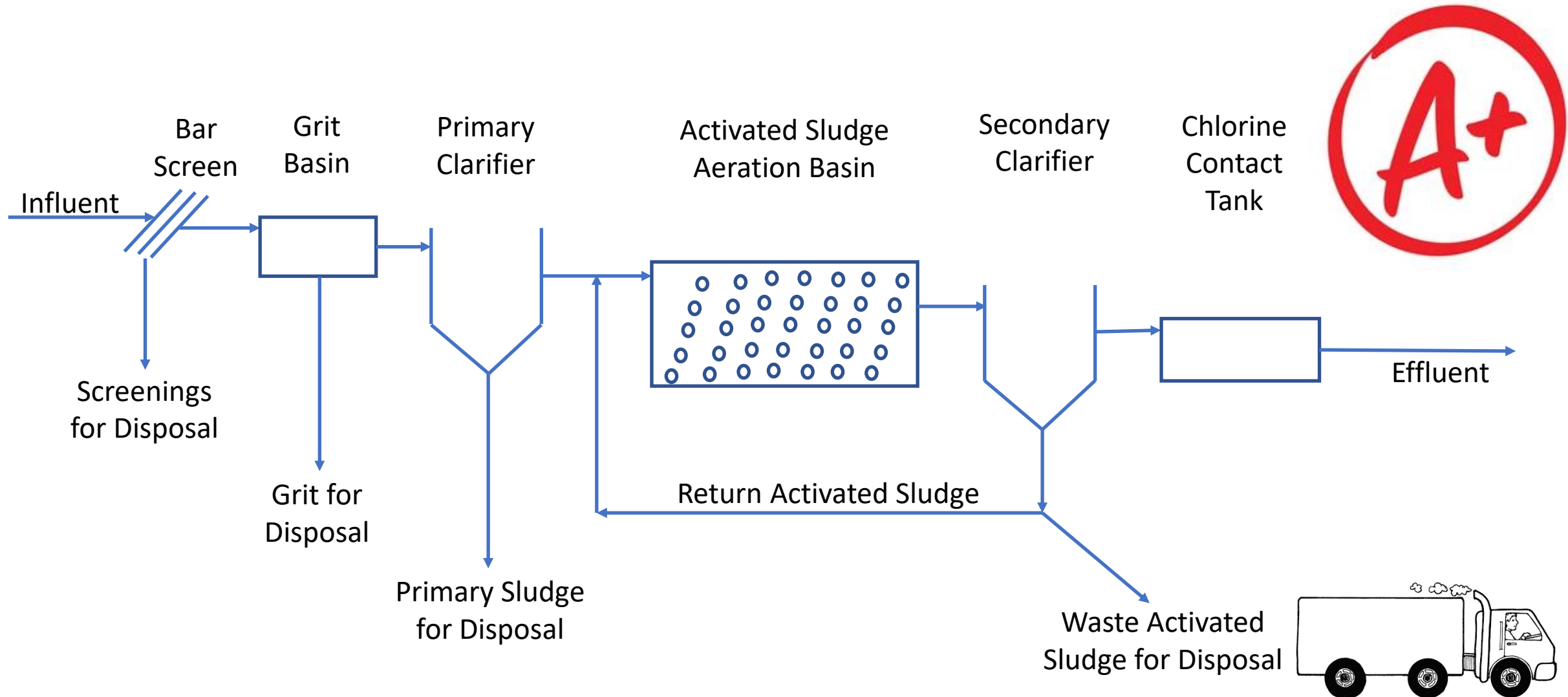


# Wastewater Treatment Plant Schematic





# Wastewater Treatment Plant Schematic



# Shift in View

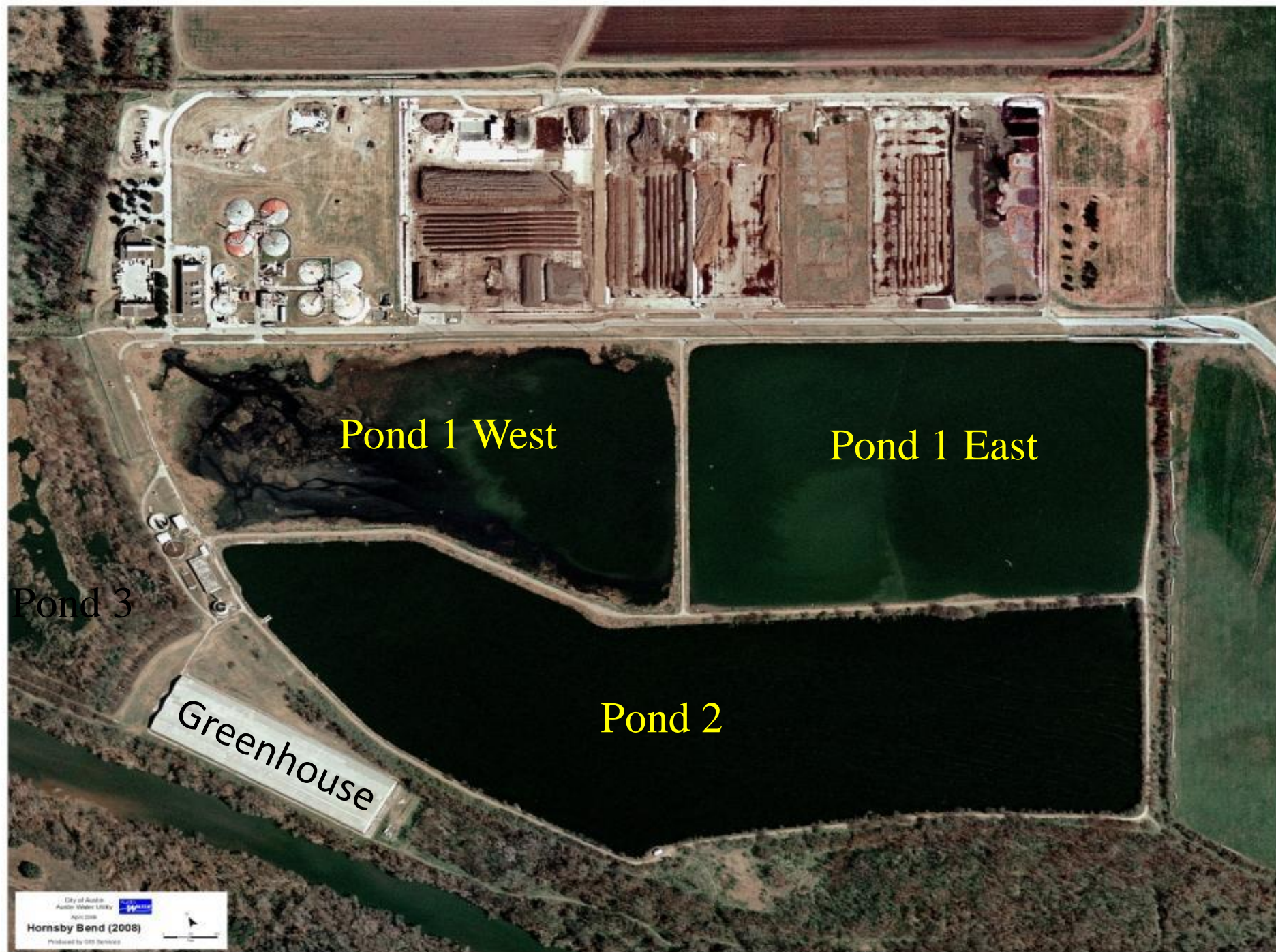
- Biosolids as an *end* point
  - Minimize life cycle cost
- Biosolids as a *starting* point
  - View as a resource to be used, not as a waste to be disposed of
  - Include sustainability criteria in alternatives evaluations
- Liquid and solids treatment affect each other, must be treated as a system and designed together





# Improvements at Hornsby Bend

- 1982-1986: Ten Anaerobic Digesters Constructed
- 1985: Aquatic Greenhouse
- 1985-1989: Construction of Sludge Drying Basins, and lagoon clean up
- City acquires 900+ acres; site is now 1,200 acres
- 1987: Composting Pilot
- 1988: Full-scale Composting
- Beneficial use of Class B biosolids by on site agricultural land application







**Belt Press Dewatering**





Biosolids Recycling  
Composting  
Class A Biosolids



# Composting

3 parts yard trimmings [carbon]

1 part biosolids  
[nitrogen/phosphorus]



All of Austin's of yard trimmings:

150,000 yd<sup>3</sup>

~12% of Austin's solid waste stream

~40% of Austin's recycling stream

Compost Pad

Yard Trimmings Processing



~7,000 tons/year of Class A Compost – “Dillo Dirt”  
and Contractor Compost Product



# Clean Water Federal Stimulus Award (2009)

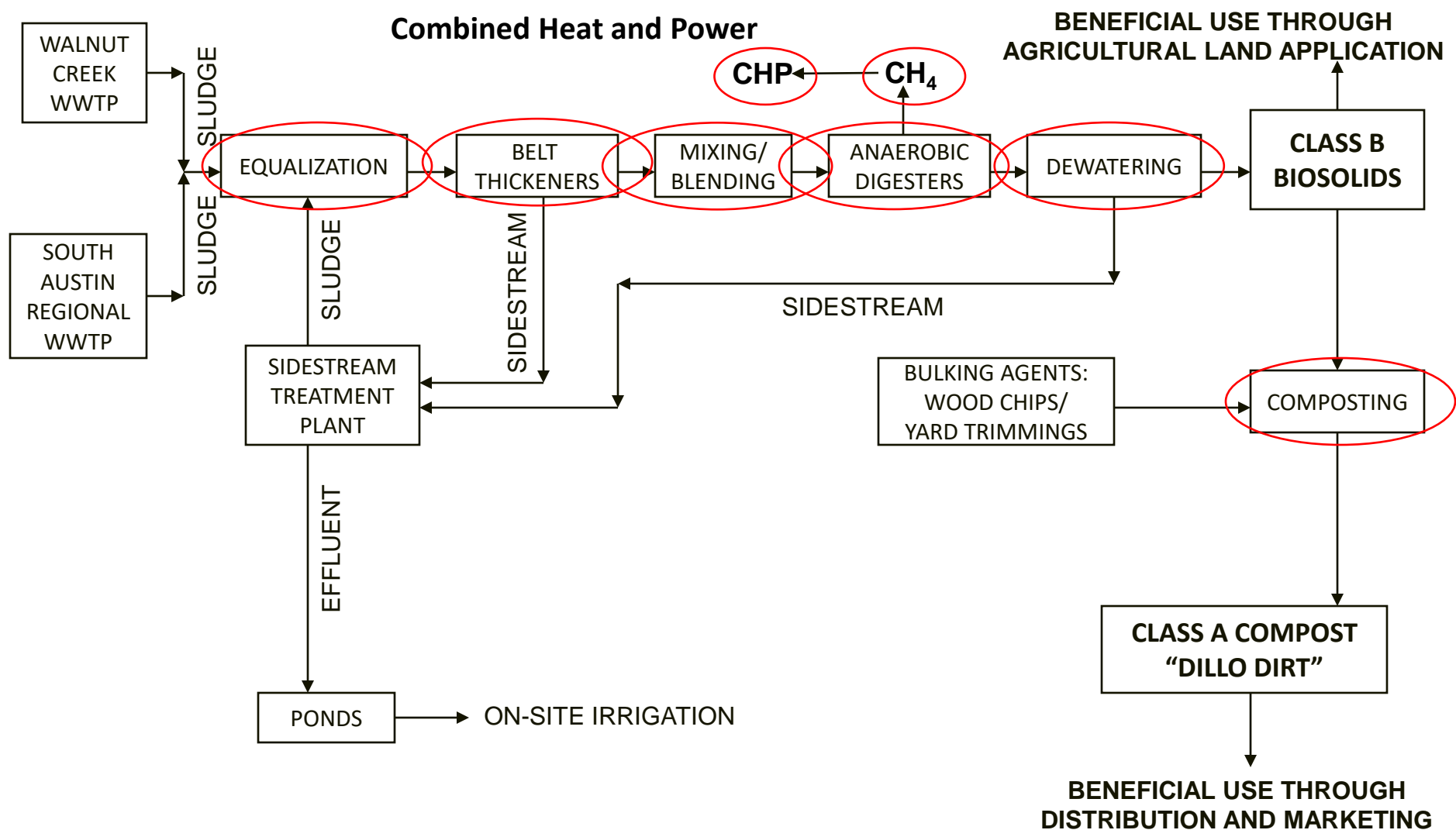


- Hornsby Bend ranked #1 in Texas among “green” projects
- \$31.8 million zero-interest Federal Stimulus Loan



- \$30.7 million in interest savings
- 80% of the funds for the “Green Reserve” projects through the Texas Clean Water State Revolving Fund

# HORNSBY BEND BIOSOLIDS MANAGEMENT PLANT



# Two Contracts with Stimulus Funds

1. \$6.95 million for Compost Pad expansion
  - Addition of 15-acre compost pad
  - Double composting capacity to use 10,000 dry tons of biosolids per year
2. \$27.95 million for digester upgrades and plant-wide efficiency improvements
  - Sludge dewatering improvements – increase capacity, reduce operation cost
  - Digester upgrades – improve process efficiency, increase gas production and capture, reduce use of petroleum-based polymers





# Digester Improvements

- Changed from floating covers to more efficient fixed covers
- Flexible membrane cover for more efficient gas storage
- New 20 HP linear motion mixers in lieu of 100 HP nozzle mix systems



# Digester Mixer Replacement

- Before
  - Nozzle Mixers
  - Inadequate Mixing
  - High power use
- After
  - Linear Motion Mixers
  - Better mixing
  - 80% reduction in power use



Nozzle Mixer



Linear Motion Mixer

# Benefits of Stimulus Fund Projects



- 560 local jobs over 3 years
- Increase digester gas production
- Compost capacity doubled to produce exceptional quality Class A compost
- Reduce diesel fuel use by 30,000 gallons/year
- 41% reduction in polymer use
- Extra 16,000 yd<sup>3</sup>/year of yard and tree trimmings used in composting by 2012
- 300 tons of fly ash in concrete for compost pad



# Benefits of Stimulus Fund Projects

(continued...)



- 6,500 tons of CO<sub>2</sub> equivalent GHG reduction by 2012
- 55% increase in energy production by 2012
- 1.75 MW electricity from a related biogas generator project – \$1.2 million grant from U.S. Dept. of Energy through Austin Energy
- Waste heat from generators for heating digesters and other uses
- Generate enough electricity for Hornsby Bend

# Combined Heat and Power from Methane

- 875 KW electricity from a biogas generator
- Waste heat from generators for heating digesters and other uses
- Hornsby Bend energy neutral
- Excess electricity goes to the grid







**CLEAN WATER  
STATE REVOLVING FUND  
2010 PISCES AWARD**

**Performance & Innovation in the SRF  
Creating Environmental Success**

**Awarded to**

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**For Innovative and Effective Use  
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# Future Upgrades at Hornsby Bend

- Centrifuges replacing Gravity Belt Thickeners – ongoing
- Sidestream Treatment – ANITA Mox – ongoing
- Exploring options for generating and utilizing biogas
- Increase CHP capacity
- Nutrient Recovery
  - Phosphorus recovery for fertilizers
- Solar Energy Farm





# Questions, Comments and Discussion

