Reverse Osmosis Manure Treatment – Technical and Regulatory Perspectives

June 20th, 2025

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Madisonmom.com

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Location

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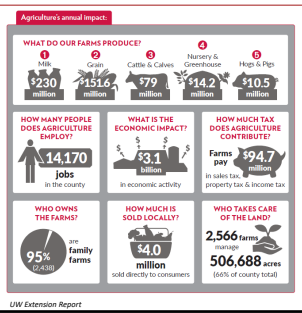
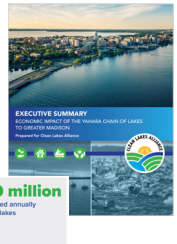
Economic Impact



UW Extension Report



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https://lpelc.org/archived-webinars/

Environmental Impact

- Manure nutrients
- Agricultural runoff
- Water quality

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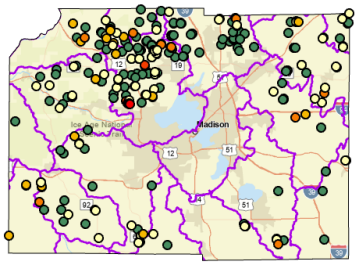
Manure Challenges

- Distribution
- Concentration/volume
- Transportation
- Scale



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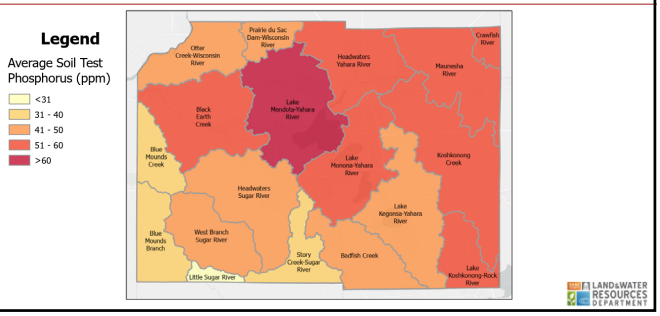
Soil Phosphorus



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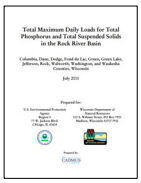
Community Solutions

Community Digesters



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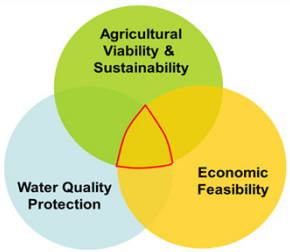
Community Manure Management Feasibility

- What are the benefits for the farmer?
- Who pays and how much?
- How do we protect the water?



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Approach

- Ag viability
  - No cost to farmers
  - Reduced manure volumes (UF/RO)
  - Less phosphorus rich manure
- Economic feasibility
  - Public / Privet ownership
  - Digesters provide revenue for maintenance by capitalizing on energy and carbon markets
- Water quality
  - Lease agreement requiring
    - 60% phosphorus removal
    - All farms abiding by Land Spreading Requirements

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Manure Treatment Facilities

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Waunakee & Middleton

- Three 1.25 Mgal digester tanks
- Centrifuge and screw press solids separation
- RNG offtake facility (originally PPA)
- Five participating farms

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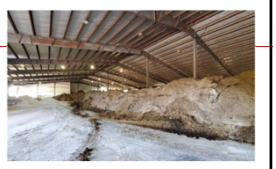
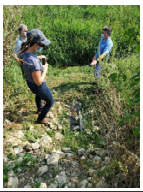
Middleton

- 71,000 sq ft solids building
- 15 Mgal storage lagoon
- Solar micro grid
- UF & RO system (NCS)
- Surface water discharge





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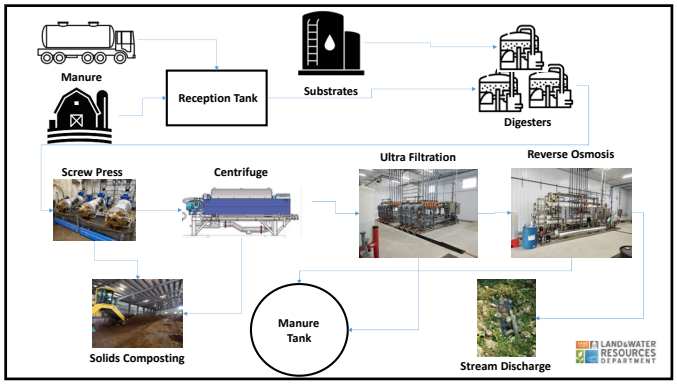

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Annual Clean Water Discharge

	Centrate from Digester	Liquid Fertilizer from RO & UF	Clean Water Discharge
Gallons per day	22,500	17,000	5,500
Percent	100%	75%	25%

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RO & UF Considerations

- **% TSS of manure is critical**
- Consistent flow
- Design capacity

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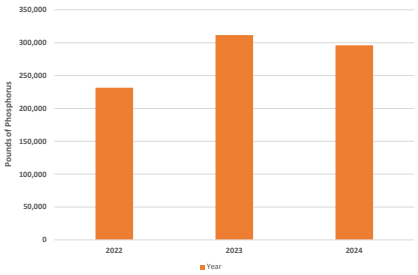
Annual Phosphorus Removal



*annual phosphorus removals are from both Middleton and Waunakee facilities.

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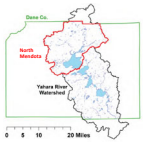
Phosphorus Comparison

	Dane County	Yahara Watershed	North Mendota
# of Animals	155,000	79,000	60,000
Total Gallons of Manure	1,059,500,000	540,000,000	430,000,000
Total Pounds of Phosphorus	4,500,000	2,300,000	1,950,000



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Permitting and Regulations

- Federal Clean Water Act (CWA)
  - EPA Approved Total Maximum Daily Load
  - 303d listed stream for phosphorus and total suspended solids
- WI State Statues, Ch 283 Pollution Discharge Elimination (WPDES)
  - NR 151 Runoff Management
  - NR 102 Surface Water Quality Standards
  - NR 212 Waste Load Allocated Water Quality Effluent Limitations
  - NR 217 Effluent Standards & Limits for Phosphorus
  - NR 243 Concentrated Animal Feeding Operations (CAFO)
- Local Dane County
  - Ch 49 Agricultural Performance Standards and Manure Management

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What's Next – Updated Feasibility Study

Protecting and improving water quality
Reducing nutrient and sediment runoff to surface water

Creating value added agricultural products
Resources generated from farms that can be purchased and sold

Investing in sustainability and carbon
Actions that have a positive impact on reducing green house gasses and CO_2 emissions

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Study Deliverables

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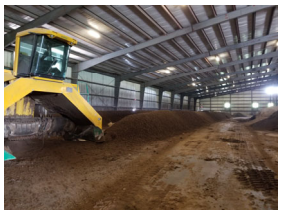
1. Recommendations on manure processing facility locations and components
2. By-product market analysis
3. Business structure
4. Economic cost analysis



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lwrd.danecounty.gov/what-we-do/community-manure-management

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