Sustainable Water and
Wastewater Infrastructure
... for Today and Tomorrow.

In my Backyard

What Cluster Systems can Offer...

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Sustainable Water and
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SOLUTIONS…

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Cost-effective and Sustainable Wastewater SOLUTIONS

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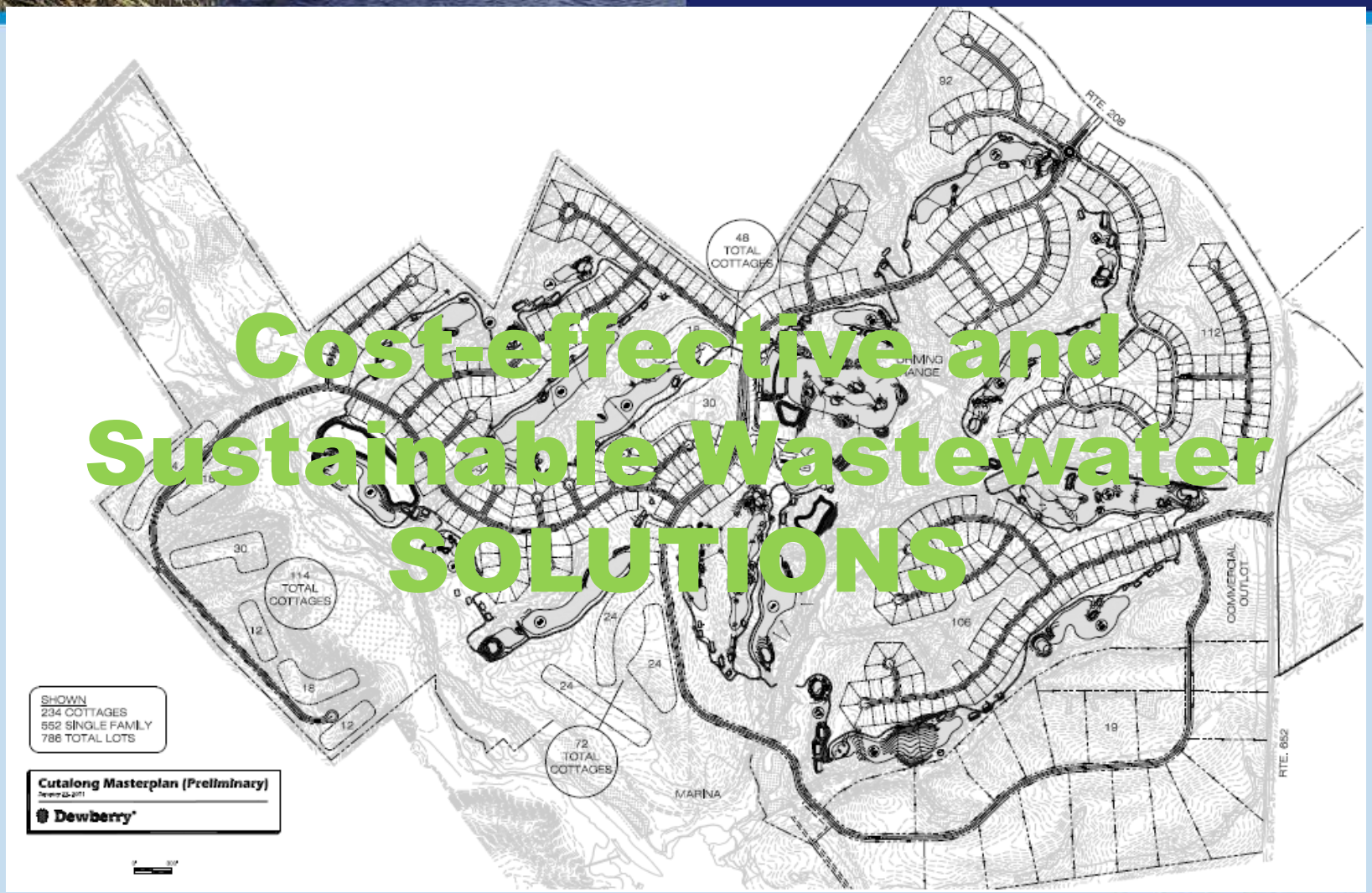


Cost-effective and Sustainable Wastewater SOLUTIONS

OUTLINE

- Managed Decentralized (Cluster) Systems;
- Technologies, Soil, and Nitrogen Loading;
- Management of Decentralized Systems;
- Real World Examples;
- Questions / Discussion.

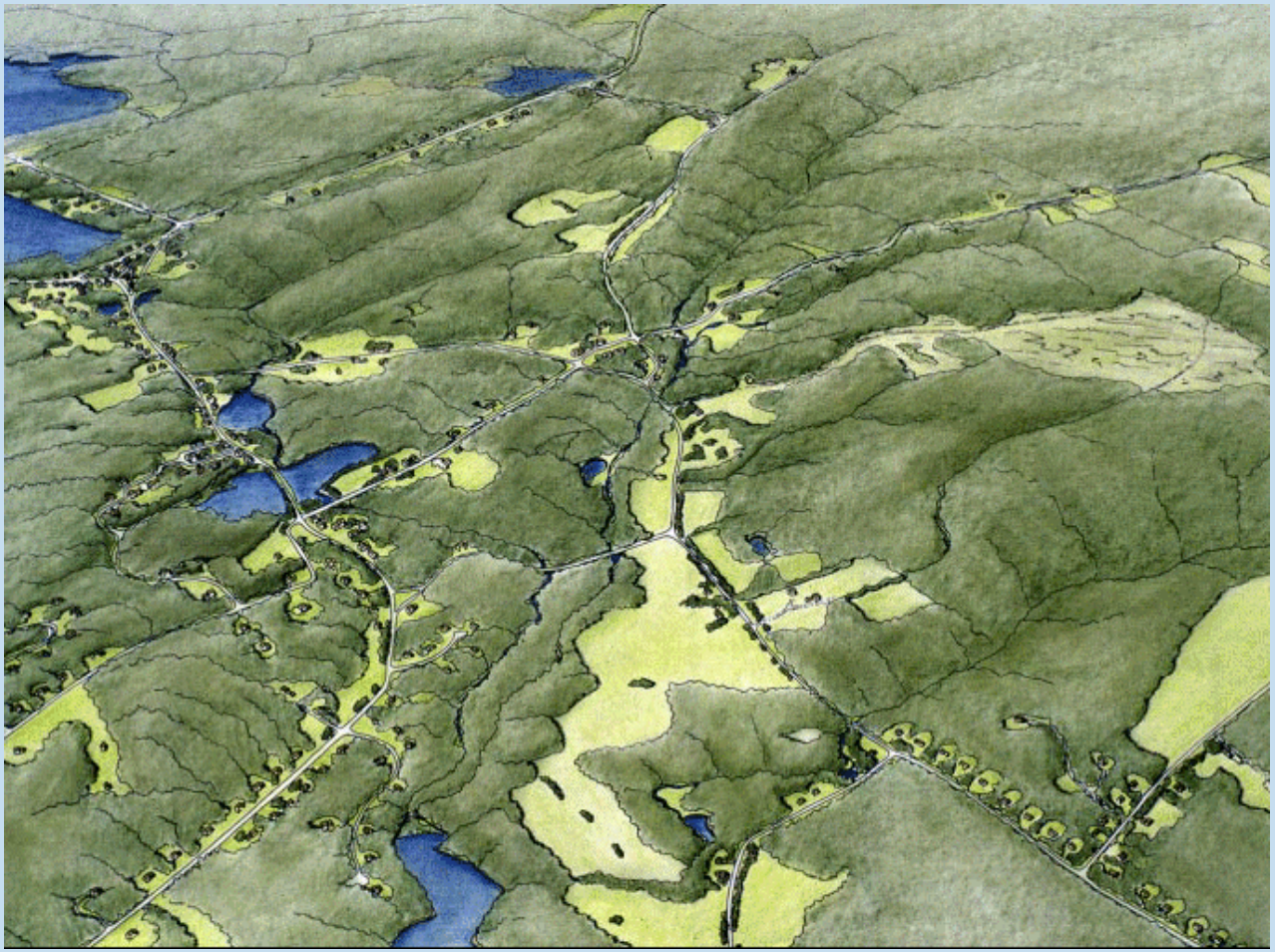
Managed Decentralized Systems

Decentralized System: An onsite or clustered system used to collect, treat, and disperse or reclaim wastewater from a small community or service area.

Responsible Management Entity (RME): A legal entity responsible for providing various management services with the requisite managerial, financial, and technical capacity to ensure the long-term, cost-effective management of decentralized onsite or clustered wastewater treatment facilities in accordance with applicable regulations and performance criteria.

Planning with Managed Decentralized Systems

Undeveloped Land Needing Wastewater Infrastructure



Planning with Managed Decentralized Systems

Plan A: On-site Option

Planning with Managed Decentralized Systems

Plan B: Cluster Option

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Planning with Managed Decentralized Systems

Choices – Plan A or Plan B?

Planning with Managed Decentralized Systems

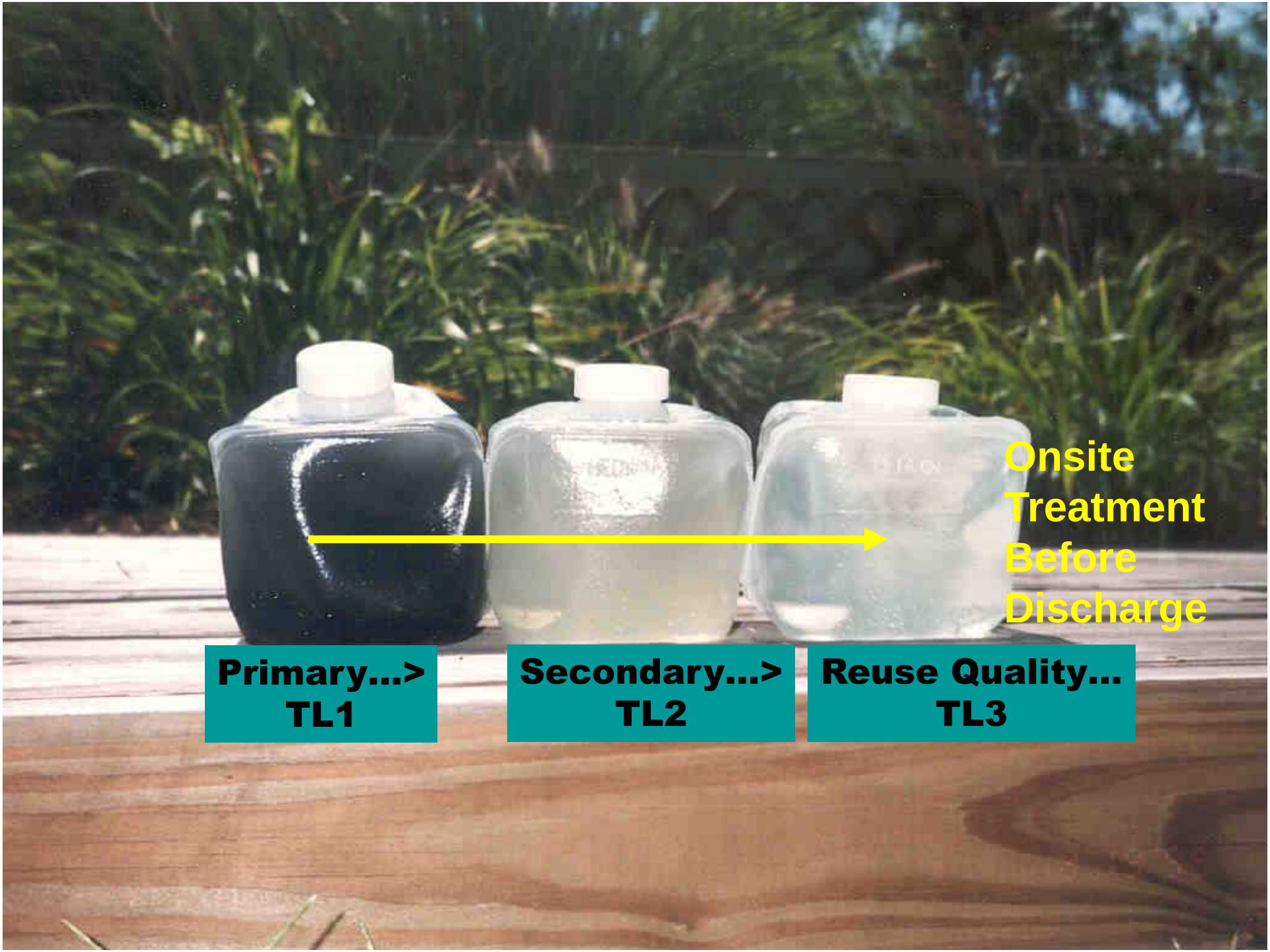
- **Which land use plan is preferable?**

  - A: Home sites on large tracks of land, without dedicated open or green conservation space;

  - B: Home sites on small tracks of land with dedicated open or green conservation space?

- **Managed Decentralized Systems can serve either plan; however…**

- **Plan B would be more Cost-Effective and Sustainable than Plan A!**


Onsite
Treatment
Before
Discharge
Primary...>
TL1
Secondary...>
TL2
Reuse Quality...
TL3

Decentralized Technologies

Wastewater Collection

Gravity Sewer

Pressure Sewer

Vacuum Sewer

Effluent Sewer

Wastewater Treatment

Septic Tanks
Aerobic Systems
Advanced Aerobic Systems
Natural Systems
Disinfection Systems
Waterless Toilets
Grey water System
HE Distillation System
Engineered Neno-particles?

Effluent Management

Trenches
Drip
Spray
Filter bed
Evapo-Transpiration Bed
Greenhouse
Indoor Reuse
Outdoor Recycle

With these tools available, we can find decentralized wastewater solution for ANY given site as long as $$$$$ is available!


ItN
MBBR Filtration Container

Managed Decentralized Systems Approach

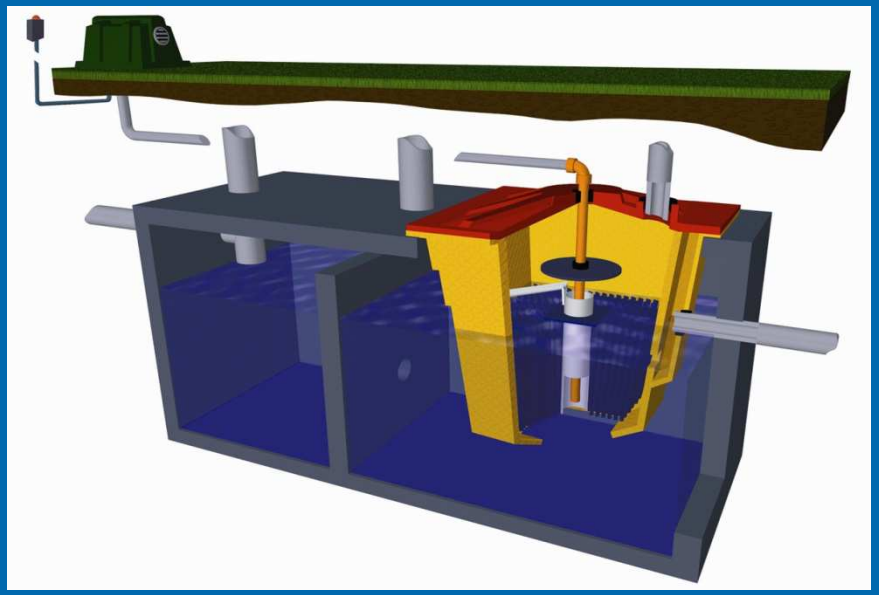
New Homes

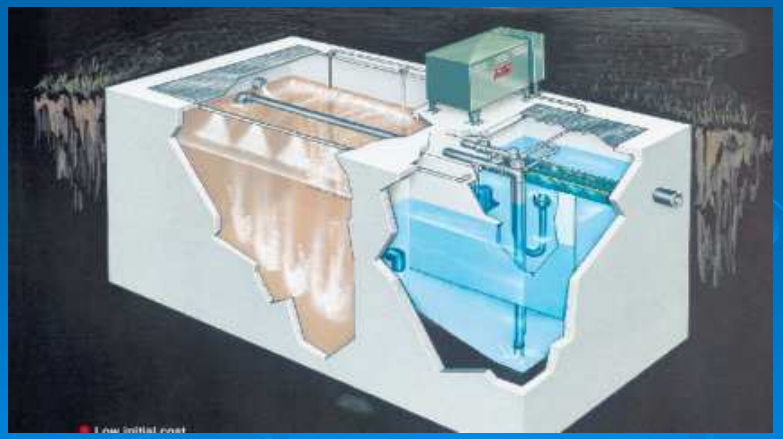
Existing Communities

Existing Homes

New Communities

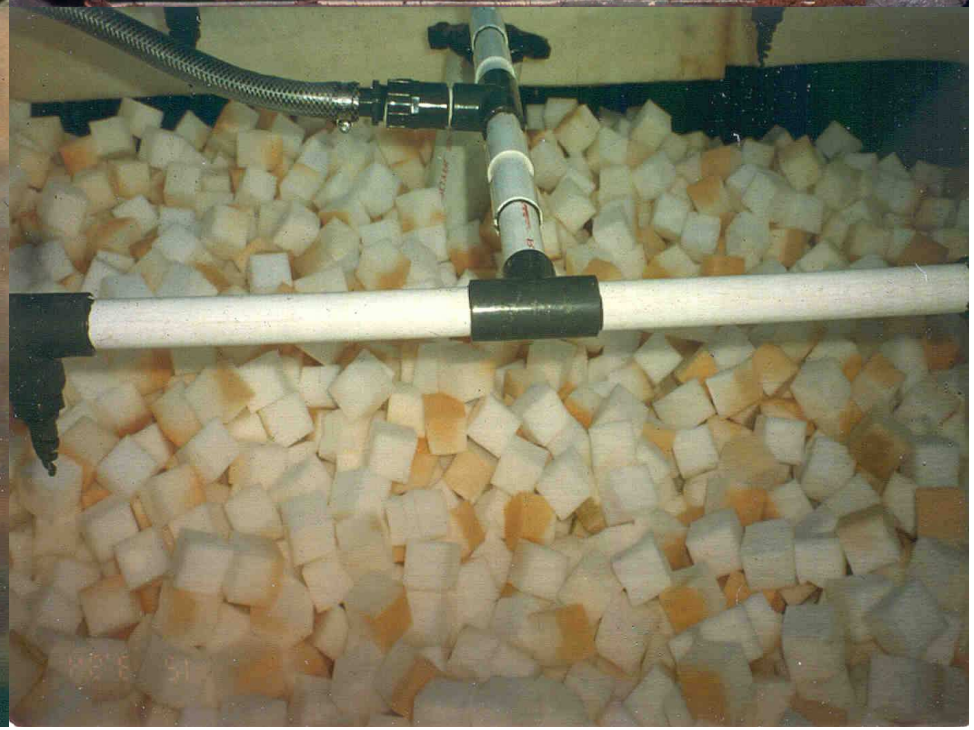
Suspended Growth Systems – *"ATUs"*





Attached Growth Systems – *"Media Filters"*

Attached Growth Systems – *"Media Filters"*



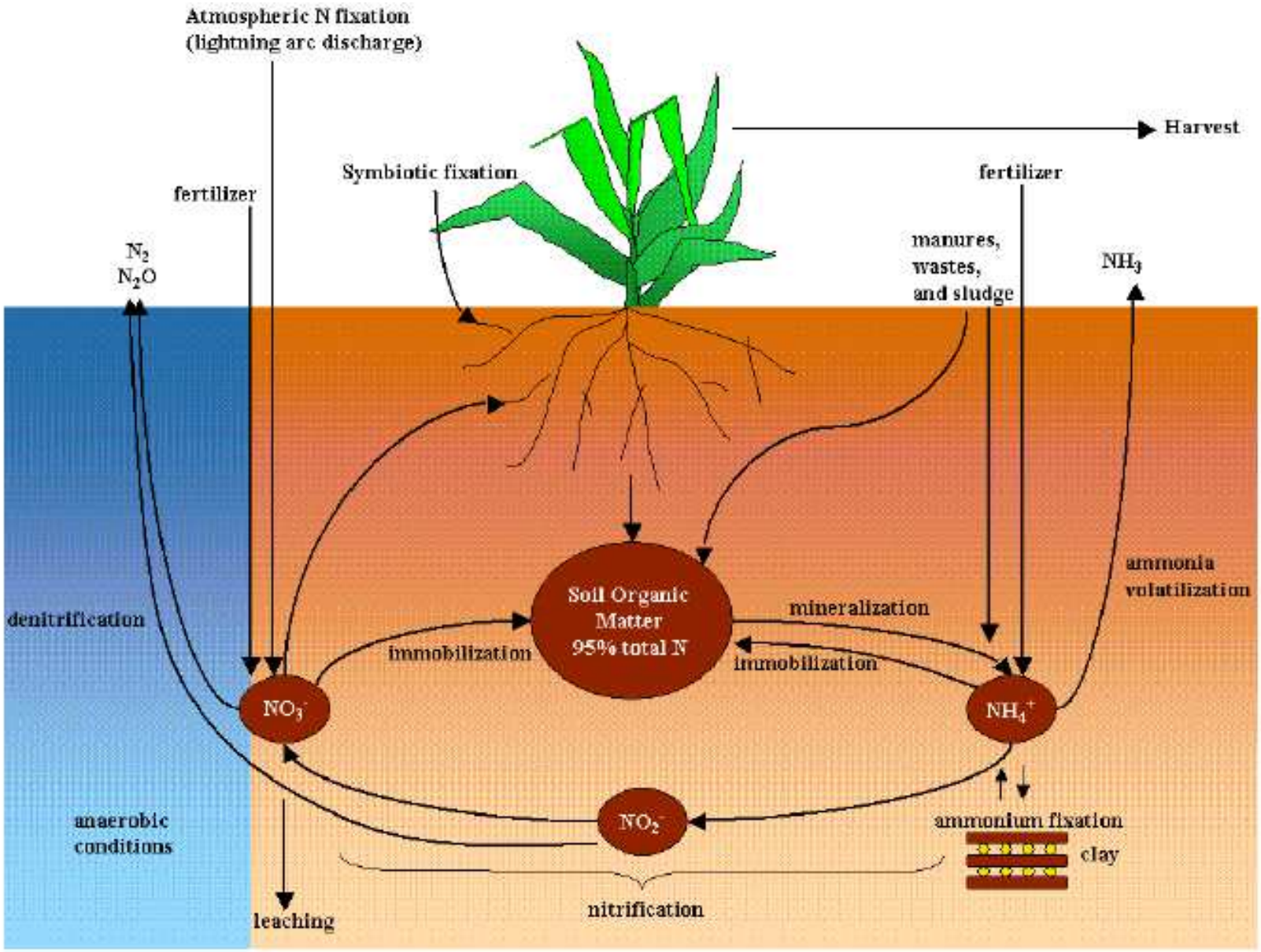


Figure 3-8. The N Cycle as Simulated by the SWAT Model.
Neitsch et al., 2002. Reprinted with permission.

Soil Water Assessment Tool

What about Nitrogen?

Nitrogen load impact from on-site systems – how much?

Upcoming regulations – requirements of end-of pipe TN 50% reduction, 20 mg/l, 8 mg/l, 5 mg/l???

What about Soil Treatment Unit? Property Boundary Compliance?

Nitrogen Loading Model based on Soil Treatment Unit (STU)…
N-Cal and STUMOD… soil texture, loading rate, depth to WT…

What about Nitrogen?

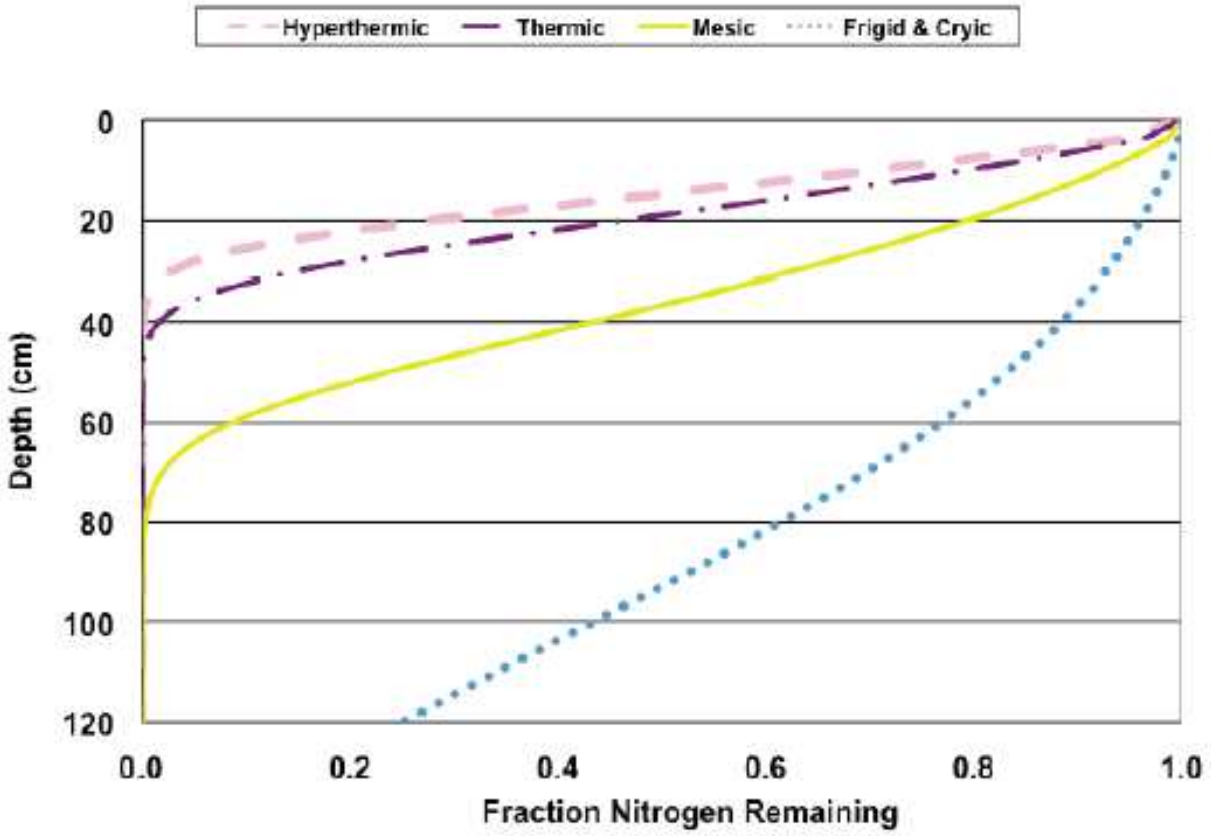


Figure VG-3. Nomograph: Clay Soil, Nitrified Effluent, HLR = 2 cm d^{-1}.

Treatment Before Discharge + Treatment After Discharge = Total Treatment

What about Nitrogen?

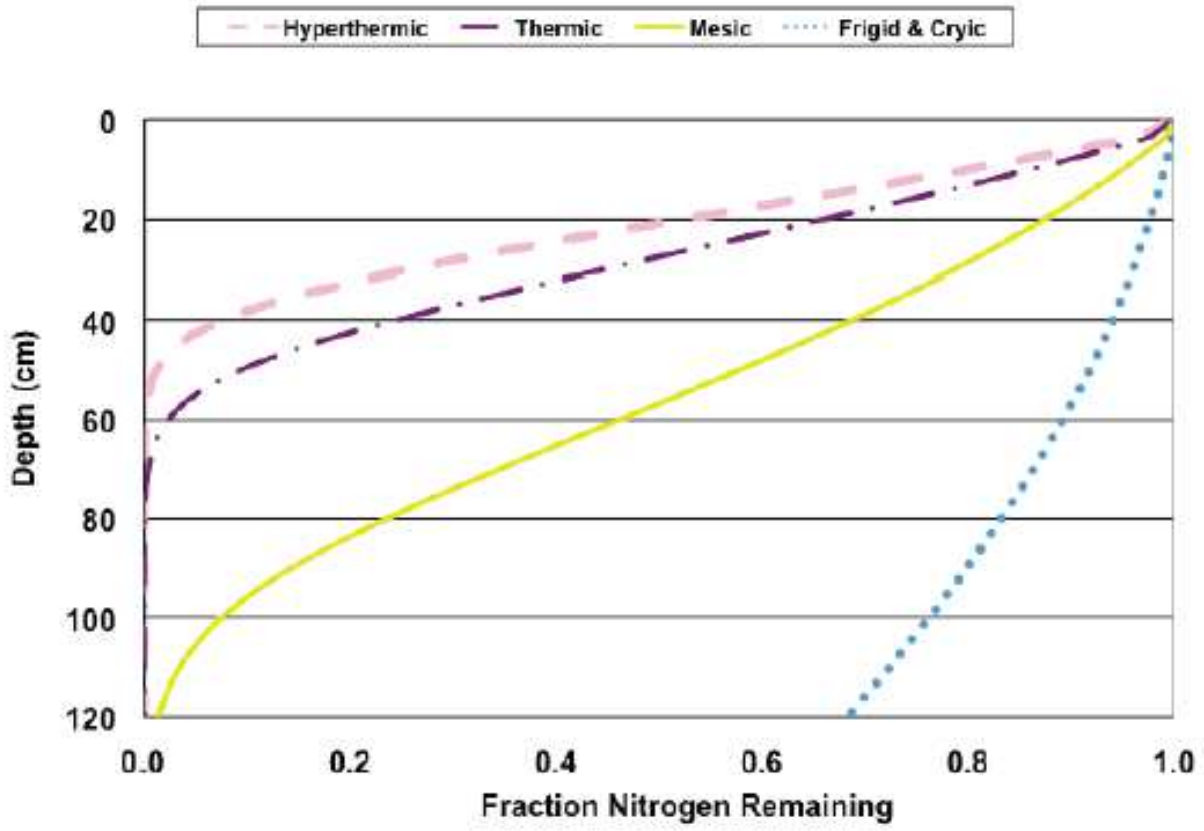
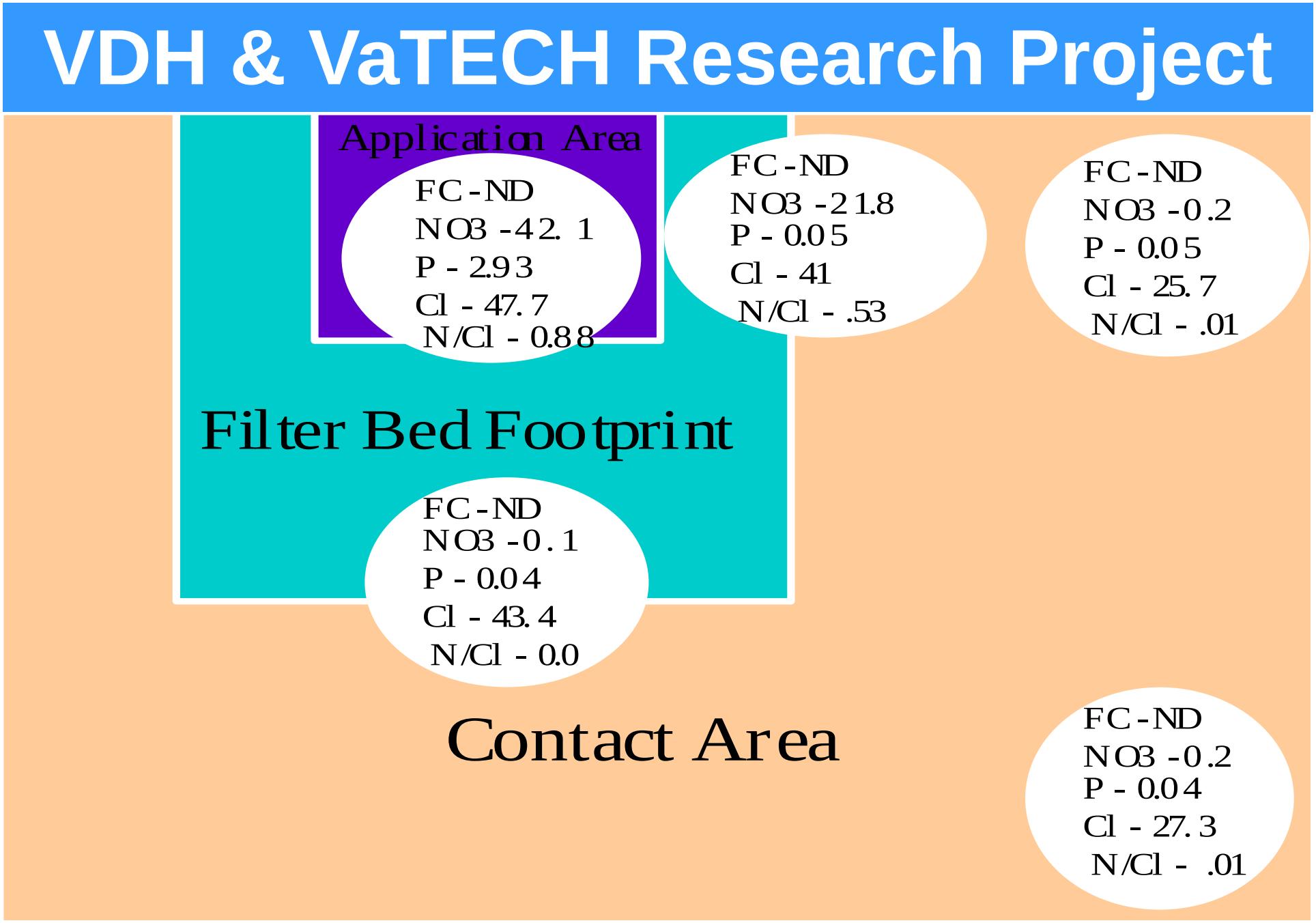


Figure VG-11. Nomograph: Loam Soil, Nitrified Effluent, HLR = 2 cm d^{-1}.

Treatment Before Discharge + Treatment After Discharge = Total Treatment

VDH & VaTECH Research Project



What about Nitrogen?

Visit www.werf.org and download Complete report (DEC1R06) and the N-Cal and STUMOD spreadsheet.

The Void

Poorly maintained conventional septic systems

Responsibly managed centralized treatment plants

Decentralized Systems to Fill The Void

Poorly maintained conventional septic systems

Responsibly managed **decentralized** systems

Responsibly managed centralized treatment plants

Decentralized Systems to Fill The Void

Poorly maintained conventional septic systems

Responsibly managed **decentralized** systems

Management By –

- Government Entity
- Non-Government Entity..

Responsibly managed centralized treatment plants

Private Option!

Private (Non-Government) Utilities – Filling the Void

- **Professional Management**
- **Charging Market Rates**
- **Maintenance Bond Security**
  - **3 Years Operating Costs**
  - **Allowance for Equipment Replacement/Upgrade**

Decentralized Systems to Fill The Void

Poorly maintained conventional septic systems

Responsibly managed **decentralized** systems

Management By –

- Government Entity
- Non-Government Entity..

Responsibly managed centralized treatment plants

Private Utility / RME Model

- Design/Build/Operate Accountability
- Predictable Monthly Budget for
  for Homeowners (no surprises or discretion)
- Regulatory Oversight of Rates
- Rates include Reserves for Replacement
- Operating Permits through the State
- States are more apt to take Enforcement
  Action against a Private Utility

Managed Decentralized Systems In my Backyard

Summary:

1. Decentralized technologies are available now for meeting wastewater treatment and reuse needs;

2. Private (non-government) utility companies are offering wastewater services in area not served by Public (government) utility;

3. Utilities can offer wastewater services in a better efficient manner with improved regulations;

4. Decentralized approach is here to stay.

Questions / Discussion

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