RESOURCES ORIENTED WASTEWATER TREATMENT: DARVILL CASE

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Traditional wastewater treatment

Resource oriented approach

Darvill Case: Nutrients

Darvill Case: Energy

Darvill Case: Water

Conclusion
Traditional WWT

Basic Process
Traditional WWT

Basic Process → Population Increase
Traditional WWT

Basic Process → Population Increase → Sophisticated Process

Screenings → Grit → Sludge → Aeration Tanks → Secondary Clarifier → Disinfection → Effluent

Fluent → Bar Rack → Grit Chamber → Primary Clarifier

Return Activated Sludge

Sludge
Traditional WWT

- Basic Process
- Population Increase
- Sophisticated Process

Flowchart:
- Fluent to Bar Rack
- Grit Chamber
- Primary Clarifier
- Aeration Tanks
- Secondary Clarifier
- Disinfection

Compliant Discharge

Screenings, Grit, Sludge

Return Activated Sludge

Sludge

Effluent
Resource Oriented

- **Nutrients**
  - Nitrogen and Phosphorus
  - Compost (low value – soil conditioner)

- **Organics**
  - Methane
  - Energy generation potential

- **Water**
  - Water scarce country
  - Drought
Darvill Case - Nutrients

**Darvill:**
- 75 Ml/d wastewater plant in Pietermaritzburg – KZN
- Currently being upgraded to 120 Ml/d

[Diagram showing wastewater treatment process including raw sewage, preliminary treatment, primary treatment, activated sludge, secondary clarification, disinfection, sludge, anaerobic digestion, WAS, land application, commercial (turf grass).]
Darvill Case - Nutrients

Darvill:
- 75 Ml/d wastewater plant in Pietermaritzburg – KZN
- Currently being upgraded to 120 Ml/d

Phosphorus Nitrogen

- Prelim Treatment
- Primary Treatment
- Activated Sludge
- Secondary Clarification
- Disinfection

Anaerobic Digestion
- P: 30%
- N: 15%

Land Application
- N: 30%

Commercial (Turf Grass)
Darvill Case - Nutrients

1. Sludge irrigated

2. Turf grass harvested

3. Sold as instant lawn

IMPROVING QUALITY OF LIFE AND ENHANCING SUSTAINABLE ECONOMIC DEVELOPMENT
Darvill Case - Nutrients

• Costs:
  ➢ Irrigation equipment (pumps, sprinklers, etc)
  ➢ Maintenance

• Benefits:
  ➢ Resource efficient sludge management
    ➢ Nutrients reuse
  ➢ ‘Free’ sludge ‘disposal’
  ➢ Environmental protection ‘removal of top soil’
Darvill Case - Energy

Darvill:
• 75 ML/d wastewater plant in Pietermaritzburg – KZN
• Currently being upgraded to 120 ML/d

1. Energy Efficient
2. Energy Generation

Raw sewage → Prelim Treatment → Primary Treatment → Activated Sludge → Secondary Clarification → Disinfection

Sludge → WAS → Anaerobic Digestion

Land Application → Commercial (Turf Grass)
1. Energy Efficient:
   ➢ Alpha meter
   ➢ OTE

- Resource efficient sludge management
- Nutrients reuse
- 'Free' sludge 'disposal'
- Environmental protection 'removal of top soil'
2. Energy Generation:
- 1 MW CHP Plant
- Procurement
- Critical load
Darvill Case – Water

Reclamation plant:
- 2 Ml/d

Unit Processes:
- Coagulation
- Settling
- Rapid gravity filtration
- UF
- BAC/GAC
- AOP (H₂O₂ or O₃ + UV)
- RO (Space)

1. Social acceptance
2. Process water
3. R&D, CECs, Standardisation
Darvill Case – Water

Yuck factor:
- DPR Class room
- Already constructed
- Public acceptance
- Normalise reuse
- KZN Water Reuse Chapter
Proposed way forward

• It’s a start, long way to go
Conclusion

Compliant Discharge
Conclusion

Valuable Product

Darvill WWW to Darvill Production Facility
Thank you