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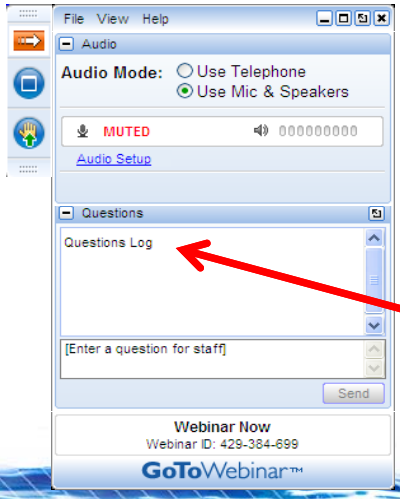
Modular Treatment Facilities for Decentralized Water Infrastructure

How to Participate Today



- **Audio Modes**
  - Listen using Mic & Speakers
  - Or, select "Use Telephone" and dial the conference (please remember long distance phone charges apply).
- **Submit your questions using the Questions pane.**
- **A recording will be available for replay shortly after this webcast.**

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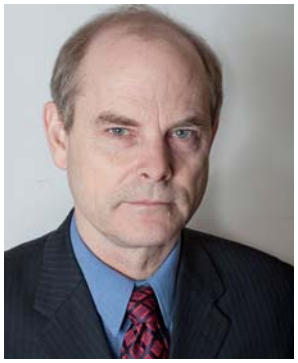
Today's Speakers



Bob Kennedy
CTO Newterra

Darin Feist
VP Sales Aeration

Dr. Albert Robert (Bob) Rubin
Professor Emeritus NCSU-BAE

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Distributed Reuse - Where are we going?

Sustainable on-site and decentralized water reuse efforts require:

Sound science and technology

Effective rules and regulations that address science and engineering

Competent personnel

Effective management

Supportive public – citizens who value what we do

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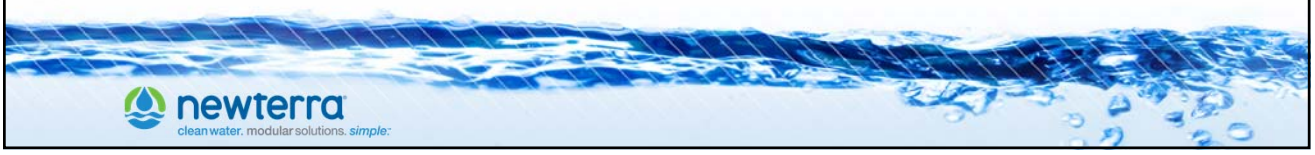
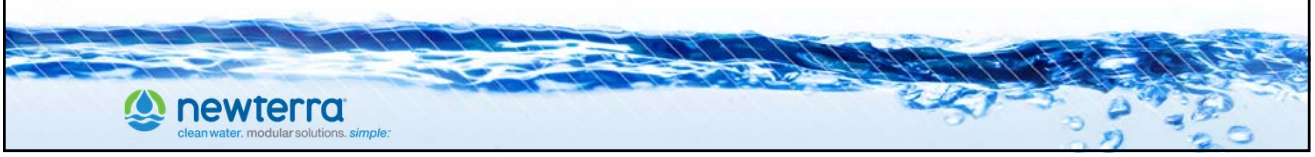
In this webinar

- Decentralized systems
  - Customers
  - Priorities
  - Newterra approach



In this webinar

- Decentralized systems
  - Customers
  - Priorities
  - Newterra approach
- Common Elements of Decentralized Systems
  - Sewage or wastewater treatment
  - Potable Water Treatment
  - Sewage Collection system and Water Distribution



Who are the customers?

Resorts

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Who are the customers?

Developers

Residential and Commercial

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Who are the customers?

Oil, Industrial and Mining Facilities

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Who are the customers?

Small Communities

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Who are the customers?

Campgrounds, Seasonal Communities and Golf Courses

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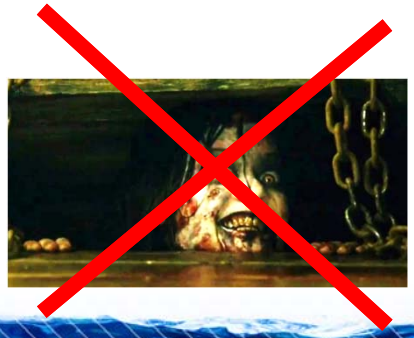
Common Themes among these Customers

- Treating water is NOT a core function of the business or community
- In fact it is a big pain and
- A necessary evil to be avoided if possible



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Given that … if they have no choice, what do they want?

- Outlay capital at a pace consistent with the development of the community or project $$$
- Maximize the amount of land available for development or prime use
- Minimize the amount of land the system uses
- Meet strict regulatory requirements or offer reuse opportunities **3.0 TN 0.05 TP**
- Ease of operation, Minimize OPEX
- Painless engineering and approval process ….

- Support through the system life including operations if needed

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How Does Newterra approach this?

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- We take pride in manufacturing truly *modular treatment facilities* – NOT just equipment in a box
- Custom Engineered, Modular enclosures are interconnected on-site to form a single permanent building
- Our process design methodology allow us to cost-effectively provide a higher level of treatment than would be feasible with any conventional approach for smaller capacities
- Our modular approach is extremely flexible to adapt to the specific needs of the application in terms of treatment, capacity and aesthetics
- Our systems are designed with the operators in mind, with a focus on equipment access and maintenance, instrumentation and automation, and operational flexibility

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Why Modular Facilities?

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newterra's Modular Treatment Facilities

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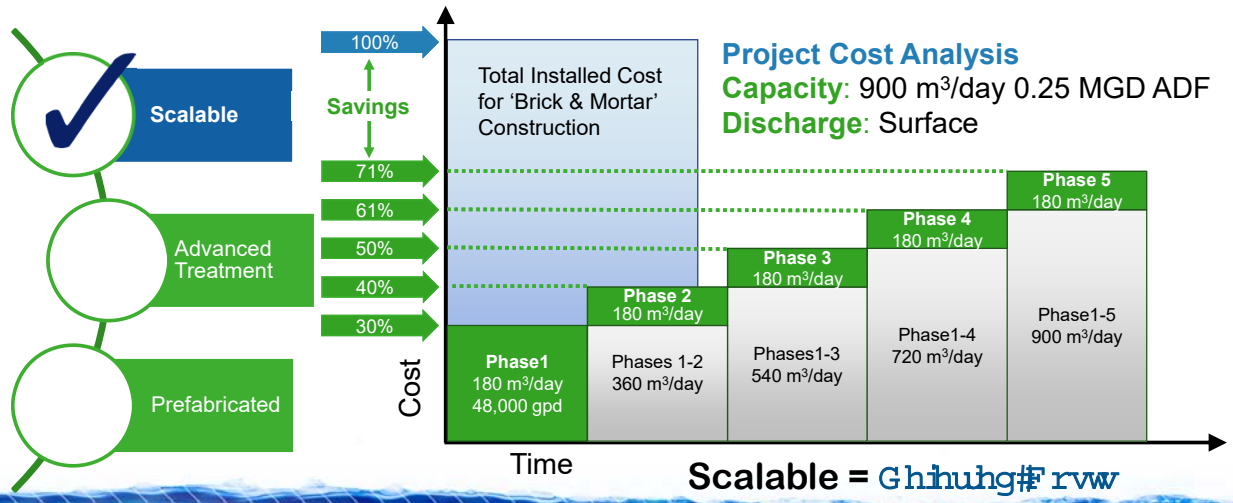
newterra's Modular Treatment Facilities



Project Cost Analysis
Capacity: 900 m³/day 0.25 MGD ADF
Discharge: Surface

Scalable = Ghihuhg#Frvw

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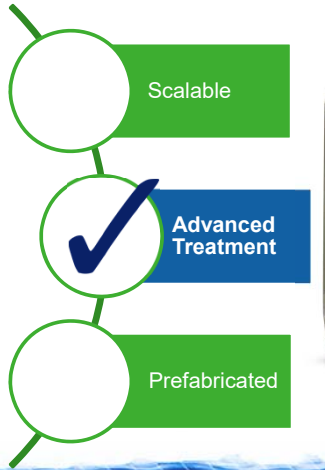
newterra's Modular Treatment Facilities



Influent		Permeate	
250	BOD_5	<2.0	mg/L
300	TSS	<1.0	mg/L
35	NH_3-N	<0.5	mg/L
10	TP	<0.05	mg/L
TBD	TN	<3.0	mg/L
–	Turbidity	<0.2	NTU

Advanced Treatment = Xqlyhuvdo#lssdfdeldw

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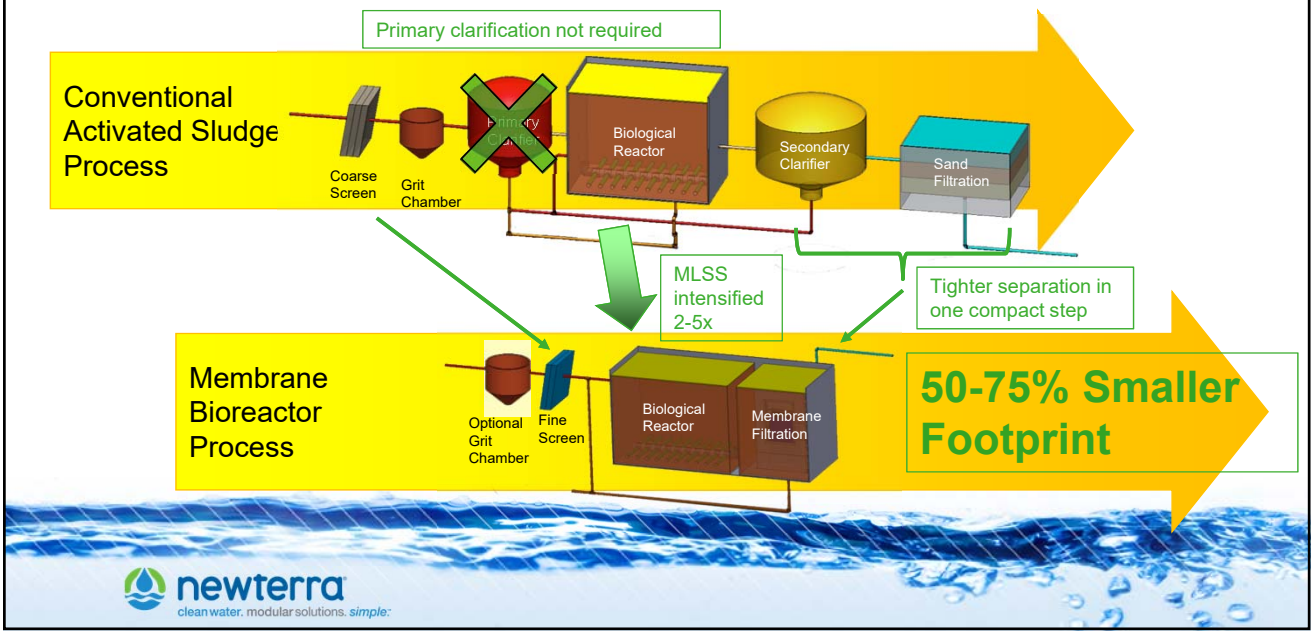
MBR Process vs. Conventional Technology



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The Heart of Our MBRs

newterra MicroClear UF Membrane

We Leave Nothing to Chance

Built in our ISO 9001:2008 facility in Germany

Creates a Physical Barrier 0.04 micron UF

Blocks bacteria, viruses, protozoa (6 log)

Reuse-Ready Permeate

Meets WHO's highest standard for reuse (food crop irrigation)

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Other Advantages

- Ease of automation
- Reduced sludge production
- Reduced operator visits – typically one or two visits per week
- Remote operation and monitoring easy to implement

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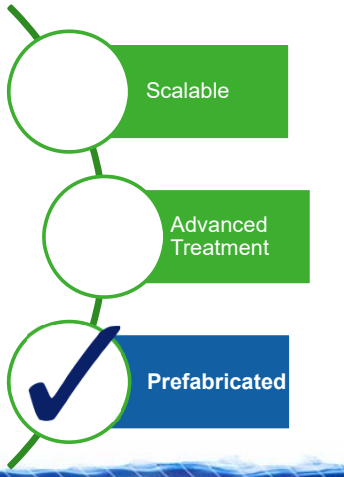
newterra's Modular Treatment Facilities



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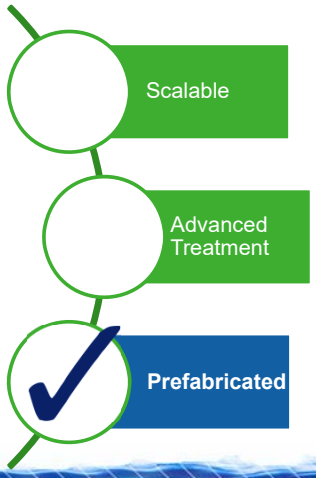
newterra's Modular Treatment Facilities



Parameter	Prefabricated	Field Erected
Htxlsp hqwF rvw	=	=
F lyl#F rvw	↓	↑
F rqvwxfwlrq#Dderu	↓	↑
F rp p lvvlrqlqj	↓	↑
T xddw|#Dvvxudqfh 2#F rqwuro	↓	↑
R q0V lwh#Z run#Vfkhgxdn	↓	↑
Vdihw	↓	↑
Total Project Cost	↓	↑

Prefabricated = Orz hu#Wrwdo#F rvw#qvwdoodwlrq

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Vertically **Integrated**

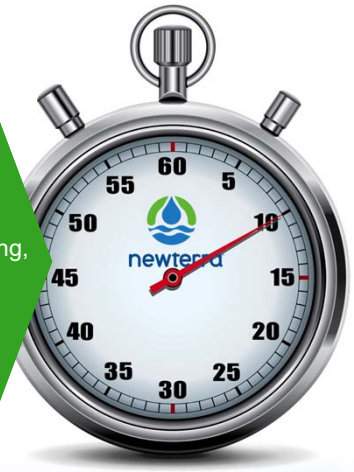
Controlling the Full Process = Best-in-Class Time to Delivery

Process & System Design

Engineering & Proprietary Technology

Manufacturing & Testing

Installation Commissioning, Field Service & Operations



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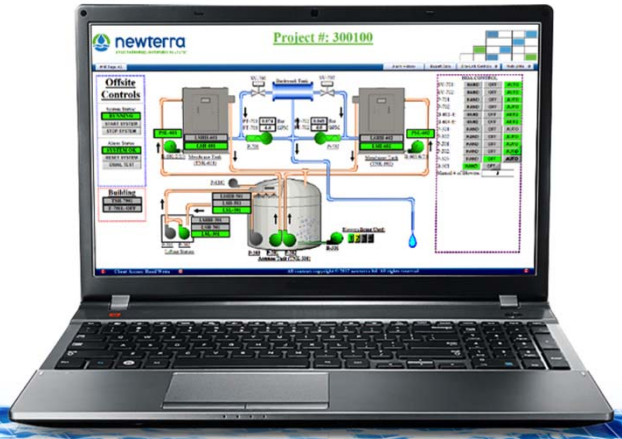
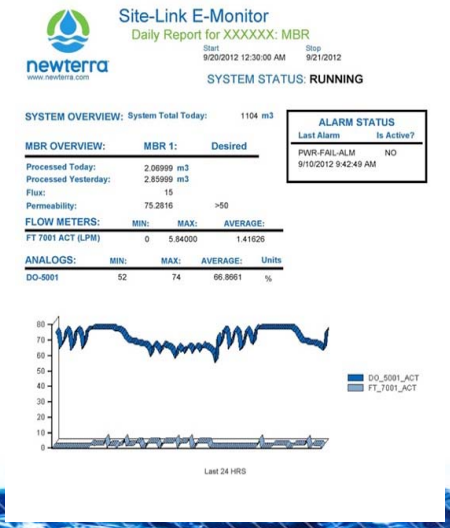
Ease of Operation

SiteLink Remote Monitoring & Diagnostics





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Collection Systems

Often the most expensive and engineering intensive part of the project is the collection system, especially for:

- Replacement for failing septic systems
- Areas with high water table such as:
  - Islands, marinas
  - Coastal communities, lakefront developments

- Areas with deep trench construction constraints such as bedrock
- Small villages, ribbon developments, remote camps or areas with rolling terrain
- Environmentally sensitive or groundwater protection areas
- New urban development in rural areas

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Qua-vac Vacuflow®

presented by newterra

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The Vacuflow/newterra Solution

Sewage flows by gravity to a Collection Chamber buried in the ground. A central vacuum system applies a constant vacuum to the piping network, buried in shallow trenches in a sawtooth fashion that allows liquid to be lifted when necessary.

Lower investment cost due to:

- Small pipe sizes
- Shallow, narrow trenches
- No manholes
- Pipe around obstacles
- No lift stations
- No electricity except at vacuum station

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The Vacuflow/newterra Solution

Operational and Maintenance Advantages

- Sewage never goes septic, low odors
- High velocity in pipes prevents blockages and scours pipe
- No infiltration means smaller treatment system
- No leakage means no environmental damage
- Build in reserve volume at home in case of power outage
- Eliminates potential for H_2S gas hazards
- Over 100 years in use as an accepted technology
- One source of power, at treatment plant is required
- With newterra treatment system installed, one source of responsibility

With newterra treatment system installed, one source of responsibility

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Regulatory Help

- Newterra provides assistance to the consultant or customer in procuring approvals
- Newterra regularly participates in reviews with the regulator and the customer/consultant
- In some jurisdictions newterra can provide permit application and management services

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Operations and Service

- Newterra maintains a customer support group who's only task is to assist customer with their systems
- A significant Parts Group supports a large base of systems going back 80 years
- Service technicians are located around the US and Canada to support systems
- Newterra operates a number of MBR plants and potable water plants throughout North America and Chile.

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Recap

- Outlay capital at a pace consistent with the development of the community or project ✓
- Maximize the amount of land available for development or prime use ✓
- Minimize the amount of land the system uses ✓
- Meet strict regulatory requirements or offer reuse opportunities 3.0 TN oh my! ✓
- Ease of operation, Minimize OPEX ✓
- Painless engineering and approval process …. ✓
- Support through the system life including operations if needed ✓

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Sample Project

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Talbotville

- Phase I for existing homes and new 70 lot development
- Phase 2 double the lots
- Phase 3 and 4 adds more lots and ties in existing septic users in the town

Final Effluent Parameter	**Objective** (maximum value unless otherwise indicated)	**Criterion**
CBOD5	5.0 mg/L	Monthly Average Concentration
Total Suspended Solids	5.0 mg/L	Monthly Average Concentration
Total Phosphorus	0.2 mg/L	Monthly Average Concentration
Total Ammonia Nitrogen	1.0 mg/L (May 1 to Nov 30) 3.0 mg/L (Dec 1 to Apr 30)	Monthly Average Concentration
E. coli	100 organisms per 100 mL	Monthly Geometric Mean Density
pH	between 6.5 - 8.5 inclusive	Single Sample Concentration

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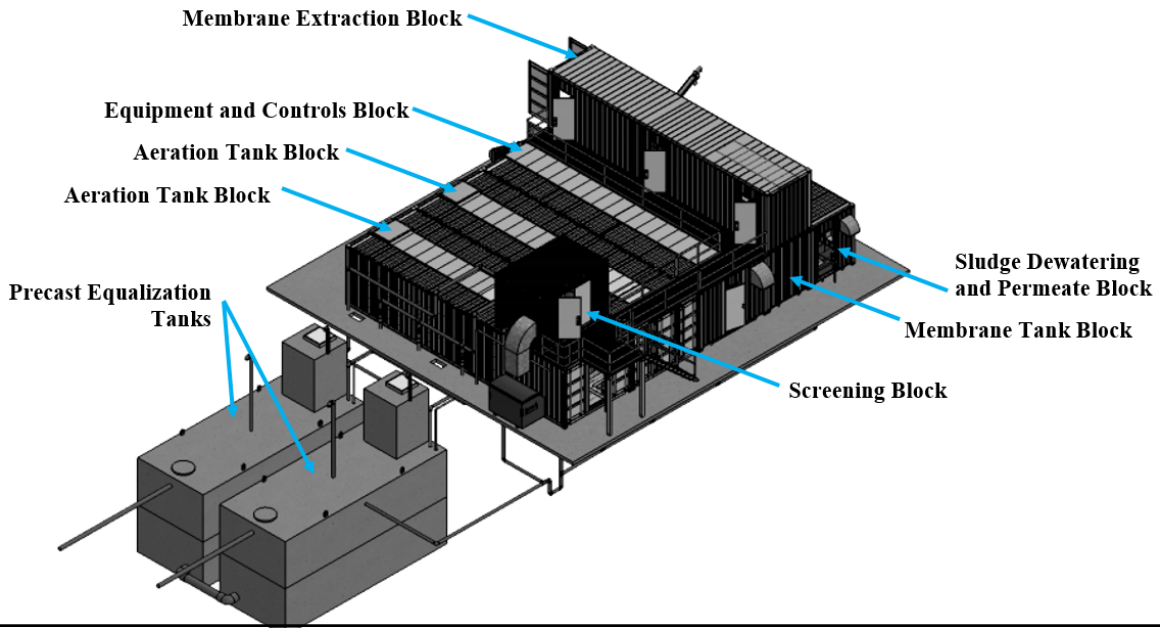
Project Profile

Modular MBR Facility

Industry: Development in Small Township
Location: Southwold, ON, Canada

Project Highlights: Modular Facility, clad finish, odor & noise attenuation, direct discharge
ADF Capacity: 500 m^3/day (132, 000 GPD), expandable to 1, 200 m^3/day (317, 000 GPD)

Talbotville's Modular WWTP

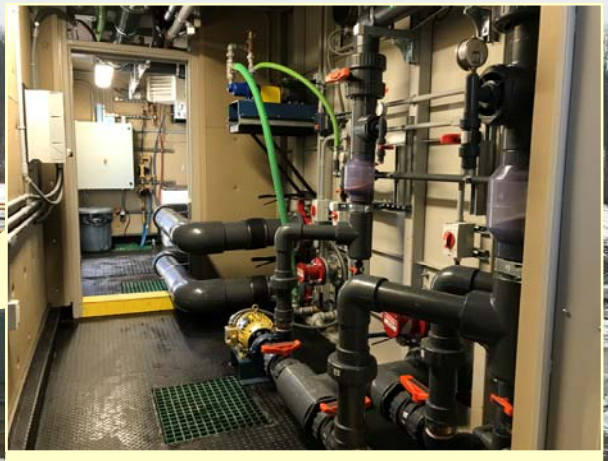



Talbotville's Modular WWTP

Talbotville's Modular WWTP

Screening and Odor Control Room

Talbotville's Modular WWTP



Corridor and Aeration Tanks

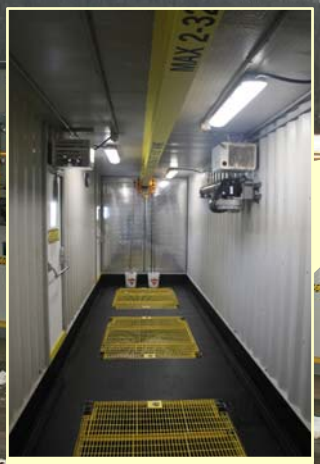
Talbotville's Modular WWTP

Blower and RAS Room

Talbotville's Modular WWTP

Permeate Room

Talbotville's Modular WWTP



Membrane Maintenance

Snapshot of Sample Projects

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Project Profile

Modular MBR Facility

Industry: Large Recreation Complex
Location: Fort MacMurray, AB, Canada

Project Highlights: Hybrid installation with inground tankage
ADF Capacity: 228 m3/day (60, 000 GPD)

Project Profile

Modular MBR Facility

Industry: Cheese Processing
Location: Canada

Project Highlights: High BOD, FOG (DAF)
ADF Capacity: 45 m3/day (12,000 GPD)

Project Profile

Modular MBR Facility

Industry: Poultry (turkey) Processing
Location: Canada

Project Highlights: High BOD, FOG (DAF)
ADF Capacity: 100 m3/day (25,000 GPD)

Project Profile

Modular MBR Facility

Industry: Marina/Resort
Location: Gananoque, ON, Canada

Project Highlights: Seasonal operation
ADF Capacity: 33 m3/day (8, 800 GPD)

Project Profile

Modular MBR Facility

Industry: Resort Community
Location: Lakes District, Ontario

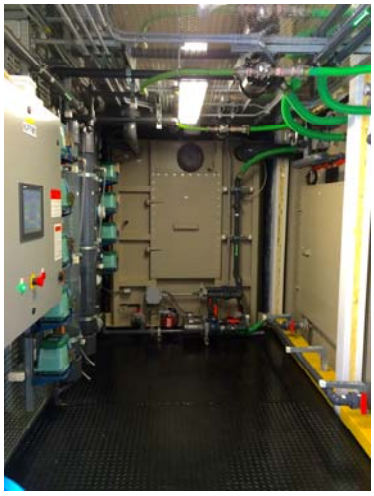
Project Highlights: Surface discharge into the pristine lake the resort is built around - the client did not want to compromise
ADF Capacity: 150 m^3/day (40, 000 GPD)

Project Profile

Modular MBR Facility

Industry: Mobile Home Community
Location: Consecon, ON, Canada

Project Highlights: Meeting strict discharge requirements on small capacities
ADF Capacity: 83 m^3/day (22,000 GPD)



Project Profile

Modular SBR Sewage Treatment Facility

Industry: Subdivision
Location: Ohio
Population: 300

Project Highlights: Uses Triton surface aeration equipment
Capacity: 70 m^3/day (17,000 GPD)
A

Project Profile

Modular MBR Facility

Industry: Oil & Gas Lodging Facility
Location: Northern Canada

Project Highlights: Remote application; no external tankage
ADF Capacity: 1500 m^3/day (400, 000 GPD) (8,000 people)

Project Profile

Modular MBR Facility

Industry: Hotel and Lodging
Location: Killdeer, ND, USA

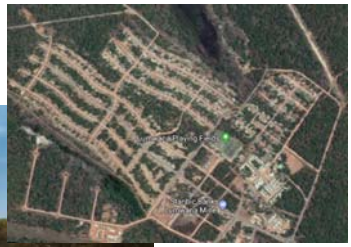
Project Highlights: Sewage receiving stations & treated effluent reuse (water sold for fracking)
ADF Capacity: 380 m^3/day (100, 000 GPD)

Project Profile

Modular MBR Facility

Industry: Mining town
Location: Zambia

Project Highlights: WHO discharge requirements TN,TP limits
Capacity: 1500 m^3/day (400, 000 GPD) (6,000 people)



Project Profile

Modular Potable Water Treatment Facility

Industry: Hydro Dam Project
Location: Near Ft. St. John, BC , Canada
Population: 2,700

Project Highlights: Highly variable surface water
Capacity: 585 m^3/day (155,000 GPD)
Includes: High flow pumping for fire prevention

Project Profile

Modular Potable Water Treatment Facility

Industry: Oil & Gas Facility
Location: Northern Canada

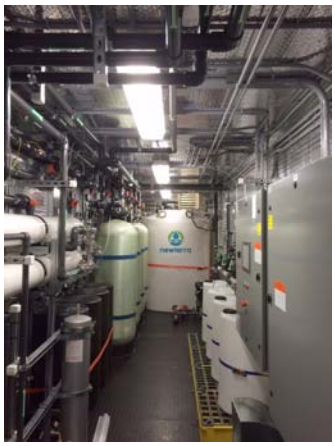
Project Highlights: Challenging groundwater (high hardness, TOC, iron & ammonia)
Capacity: 380 m^3/day (100,000 GPD)

Project Profile

Modular Potable Water Treatment Facility

Industry: Rural community
Location: Wembley, AB, Canada

Project Highlights: Small township solved its long-standing water issues quickly and within their budget
Capacity: 300 m^3/day (80,000 GPD)



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Think Inside the Box™