Advancements in Pool Filtration Technology

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&
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Vanderhoof Aquatic Centre – Vanderhoof, BC

INTRODUCTION

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BUILDING LEGACY

The AME Consulting Group Ltd. (AME) is a full service mechanical consulting engineering firm specializing in sustainable and simple solutions.

Guildford Aquatic Centre, Surrey BC
Photo Credit: Ema Peter

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   - Heating, Ventilation, Air Conditioning
   - Plumbing
   - Fire Protection
   - BIM REVIT
2. Building Systems and Studies
   - Building Condition Assessments
   - Feasibility Studies
   - Energy Incentive Studies
   - Measurements & Verifications (M&V)
   - Energy and Thermal Modeling
   - Natural Ventilation Systems
   - Pool Commissioning
   - Thermal Storage Systems
3. Specialized Services
   - Arena Refrigeration Plant & Ice Slab Design
   - Swimming Pool Hydraulics
   - Pool Filtration & Disinfection
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   - Pharmaceutical & Research Laboratories
   - Low Temperature Air Designs
   - Reality Capture (3D Scanning)

Terwillegar Community Centre-Edmonton, AB

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Agenda

- Introduction
- History of Filtration
- Common Filtration Types
- Emerging Technology
- Filtration System Enhancements
- Approach to Filter Selection
- Question & Answer

Canada Games Centre - Halifax, NS

UBC Aquatic Centre - Vancouver, BC

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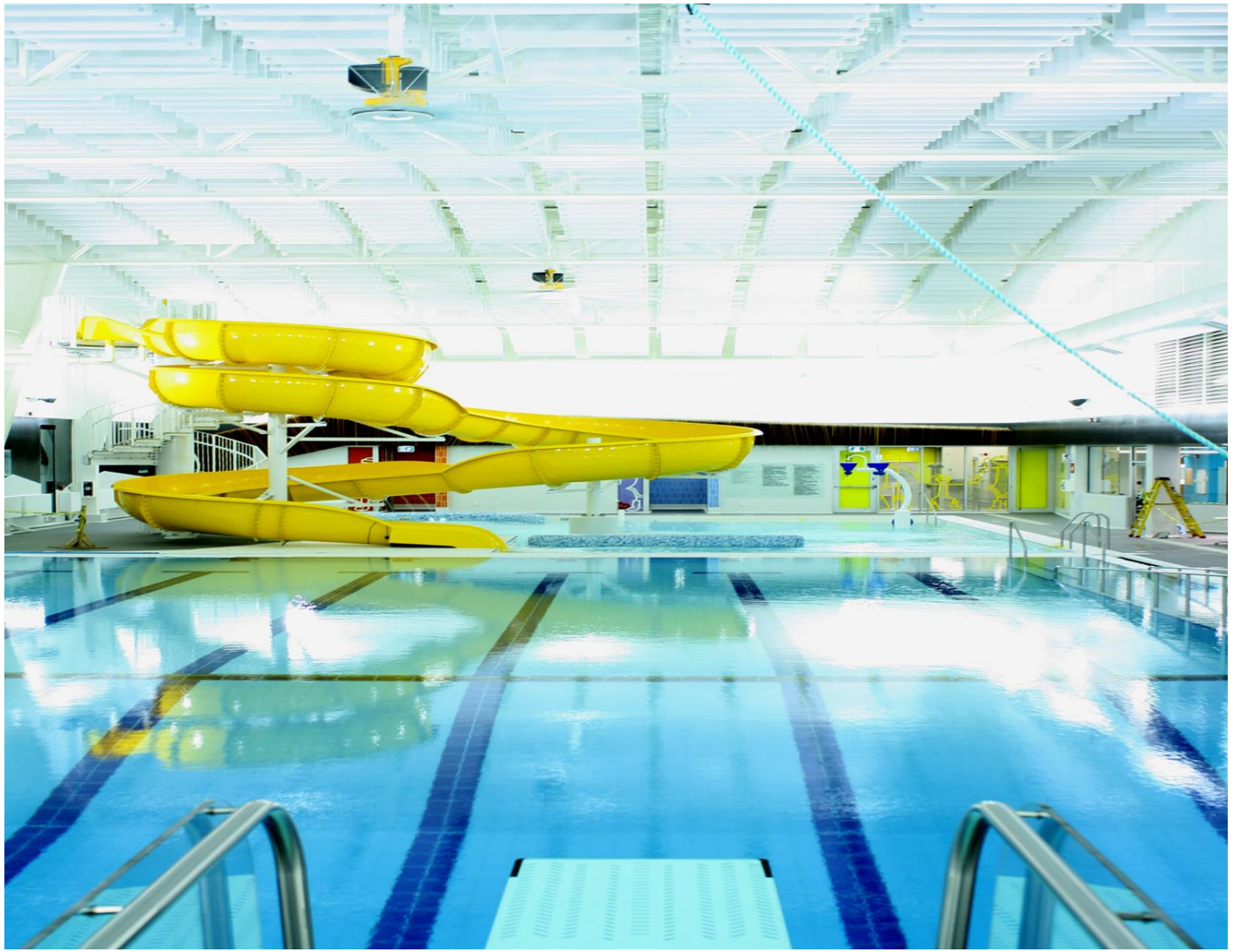

Iqaluit Aquatic Centre – Iqaluit, NU

HISTORY OF FILTRATION

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HISTORY OF FILTRATION

1

Natural

Eco Filtration

300 BC

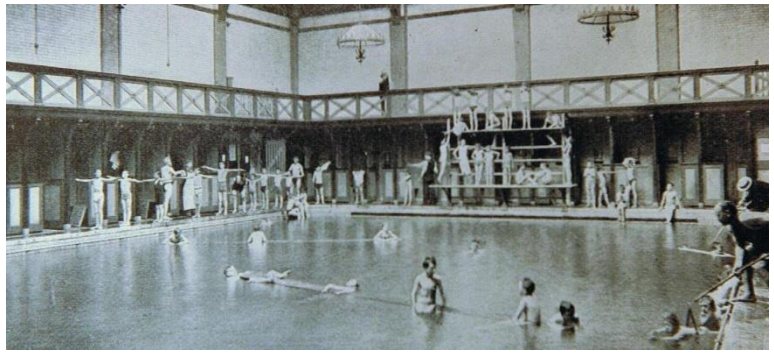
2

Roman Aqueducts

1800-1900

3

Early Pools



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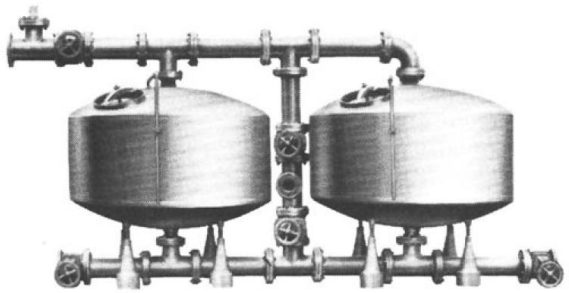
HISTORY OF FILTRATION

1900-1945

4

Early Pool Mechanical Filtration



1945-Present

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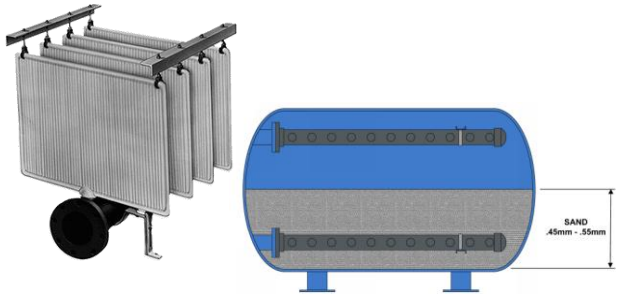
Modern North American Technology



2018

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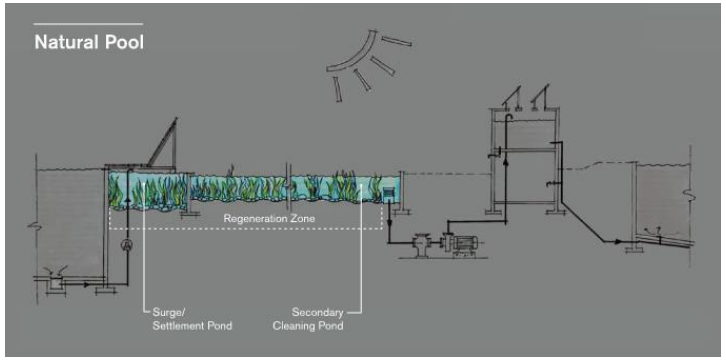
Natural Pools



Future

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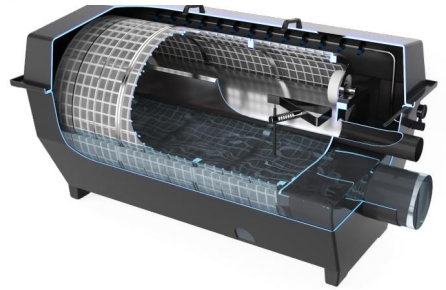
New European Technology



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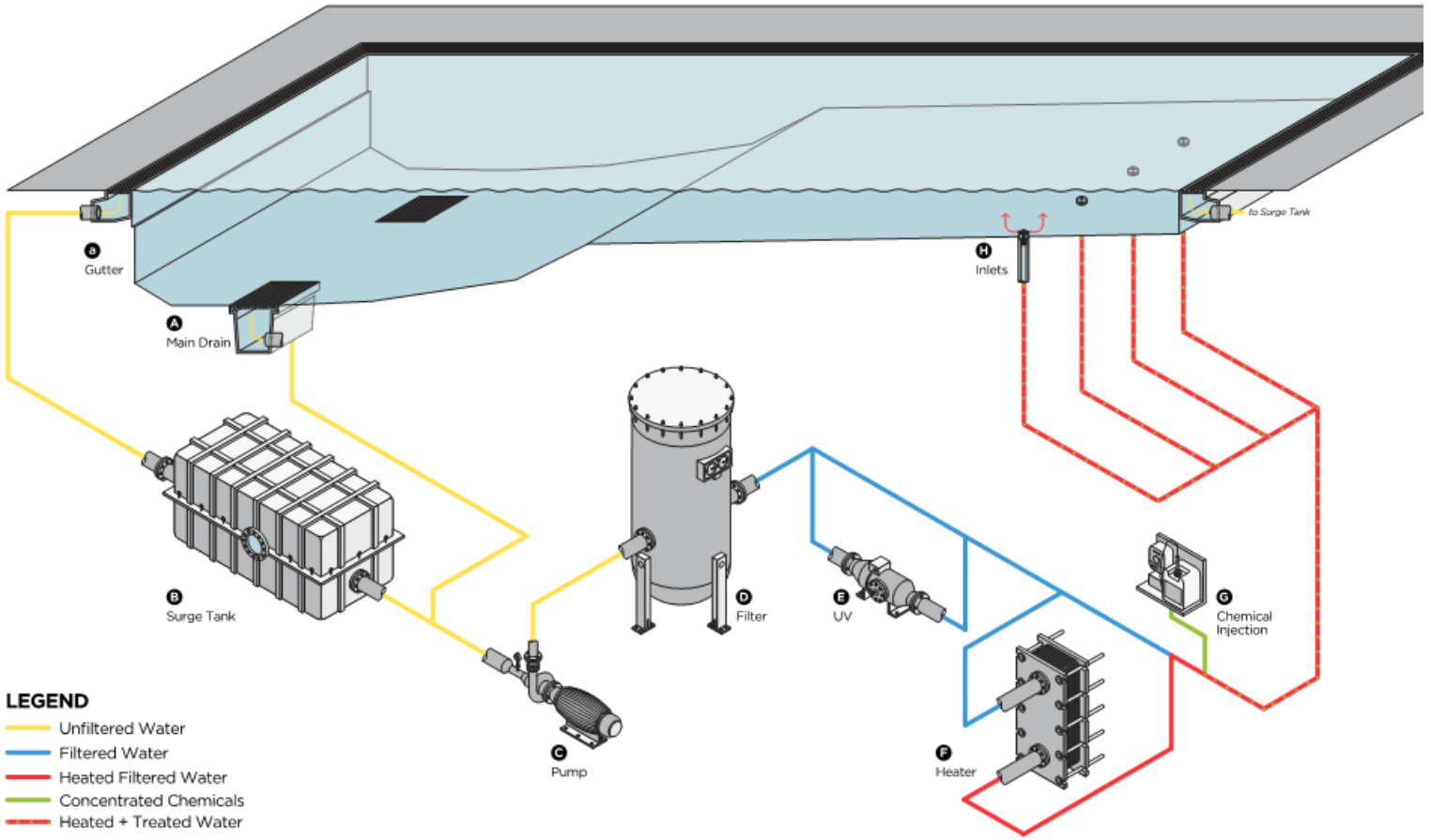

COMMON FILTRATION TYPES

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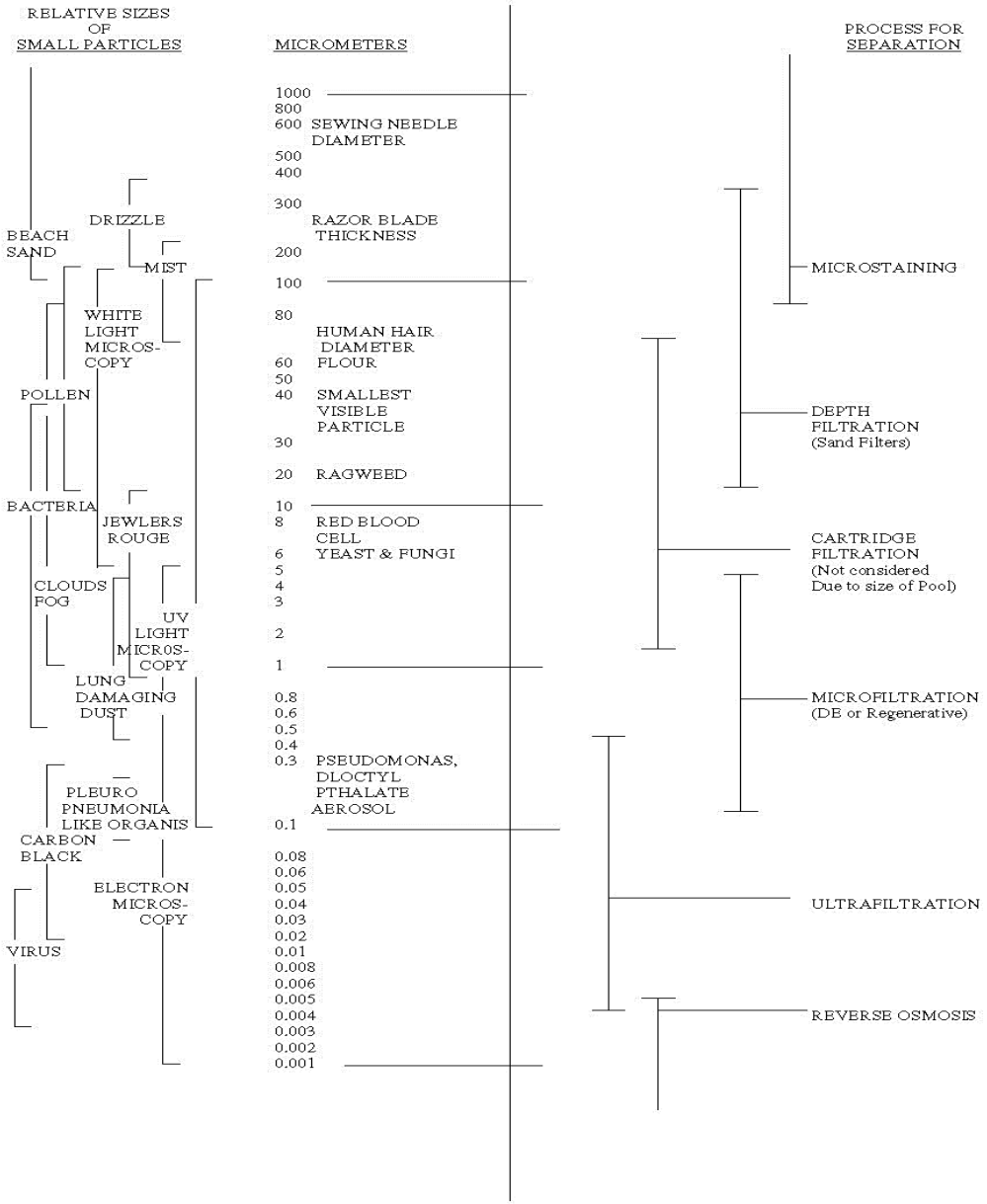
FILTER PERFORMANCE - MICRON



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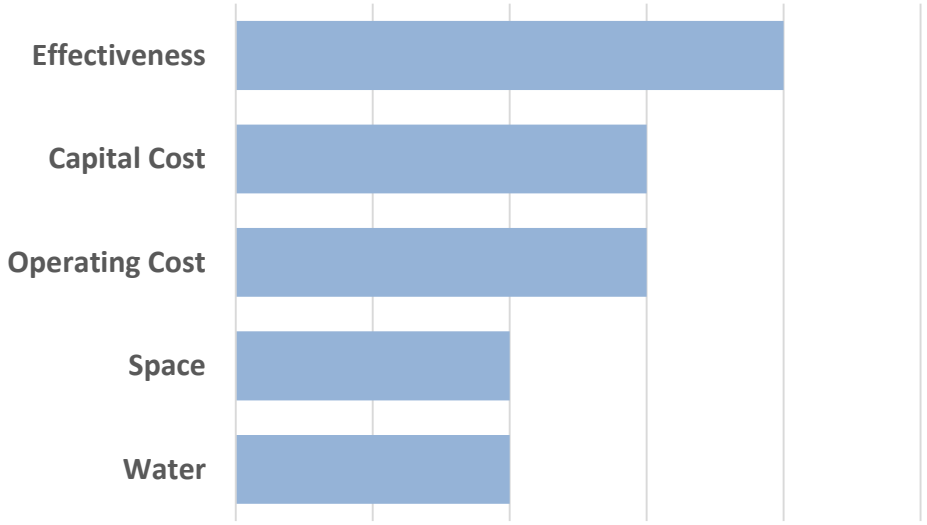
VACUUM DE



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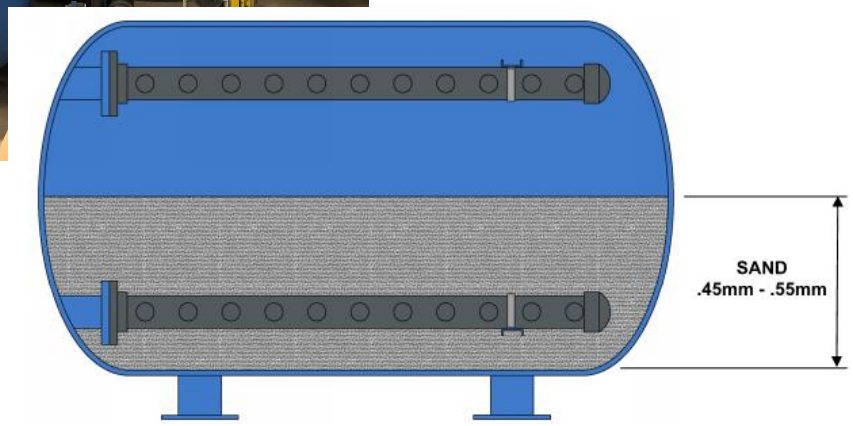
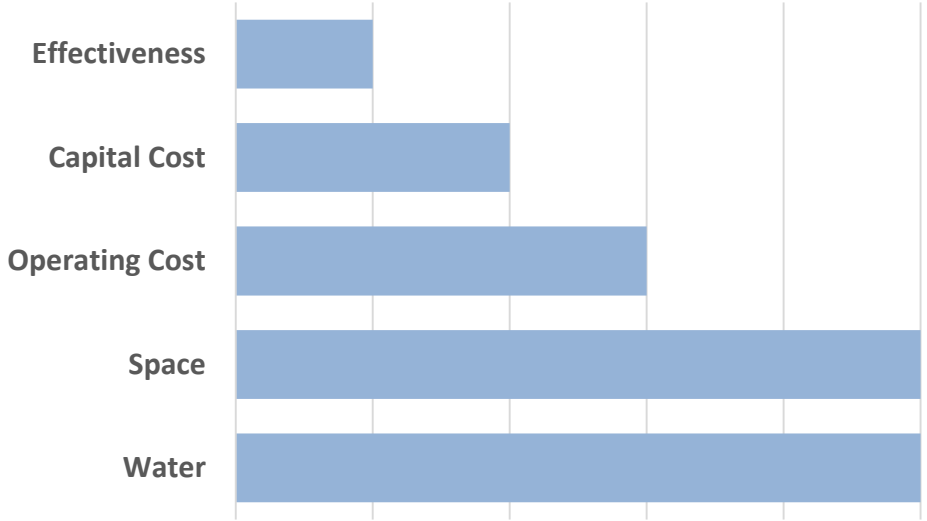
HI-RATE SAND





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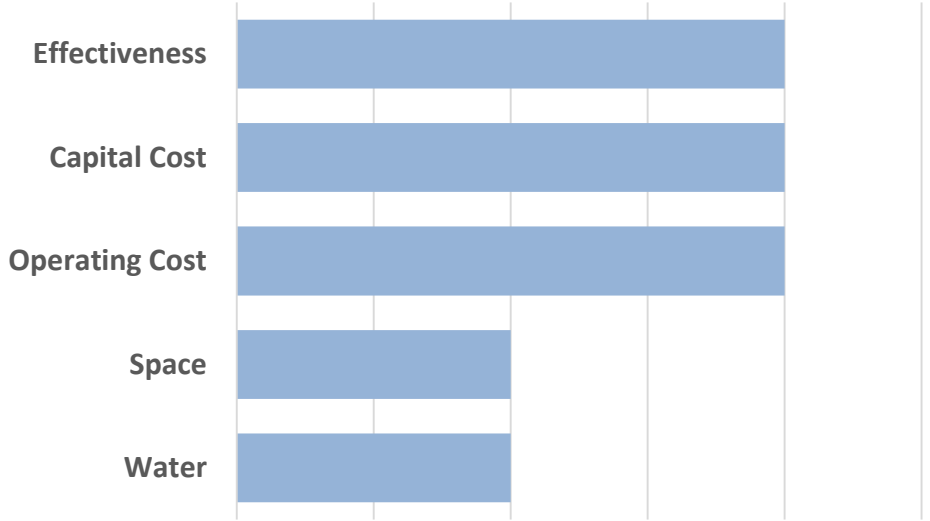
PRESSURE REGENERATIVE



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MULTI-LAYER SAND

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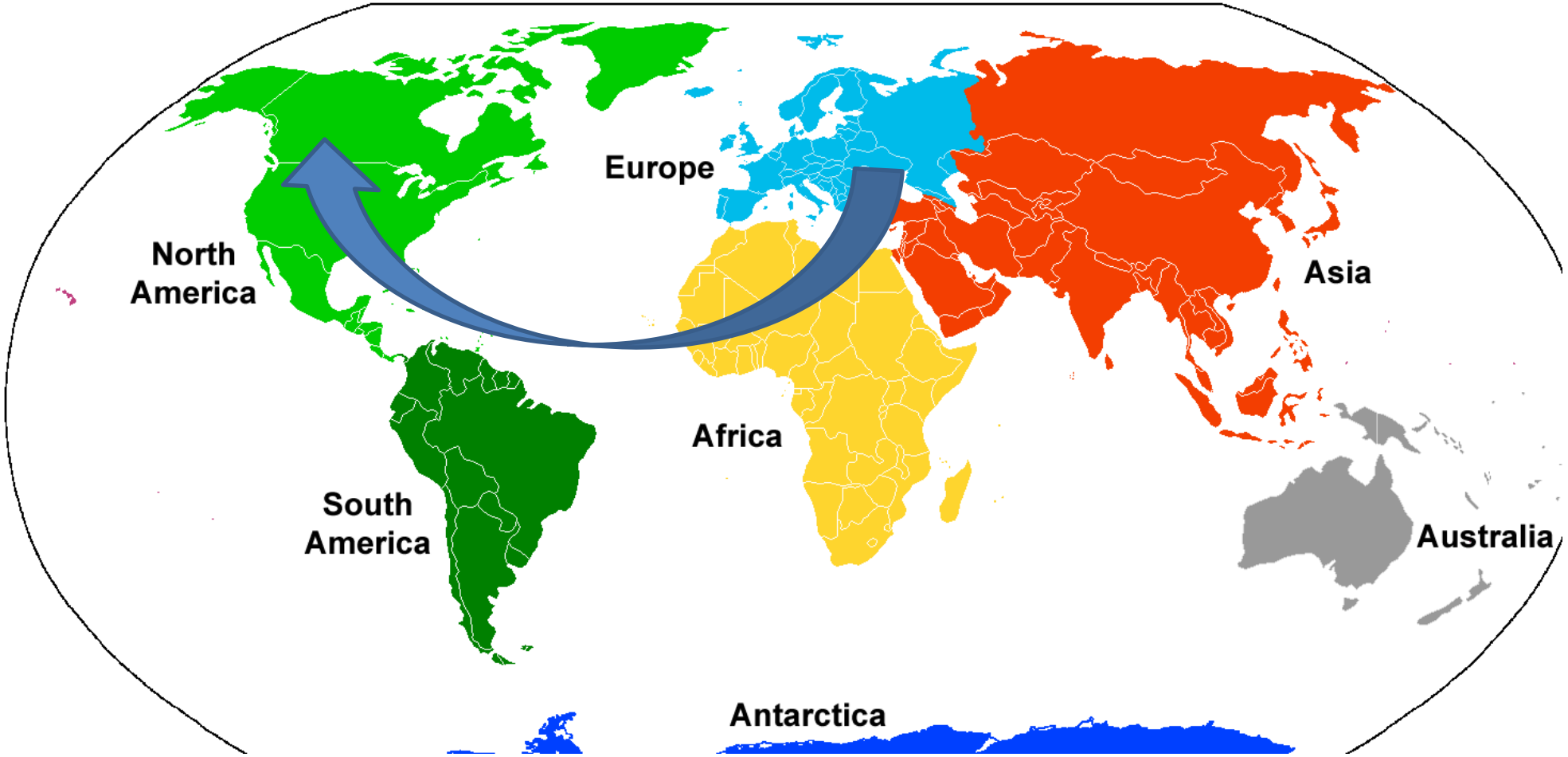

EMERGING TECHNOLOGY

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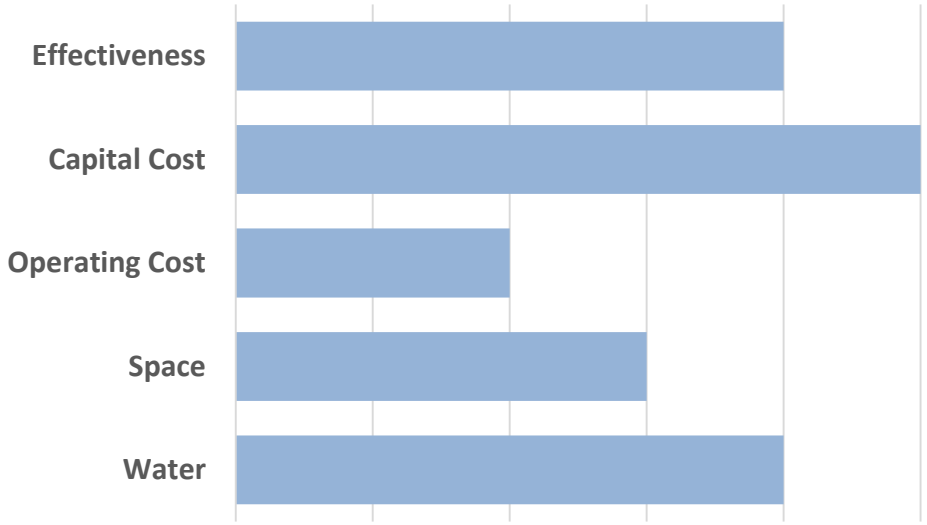
MEMBRANE



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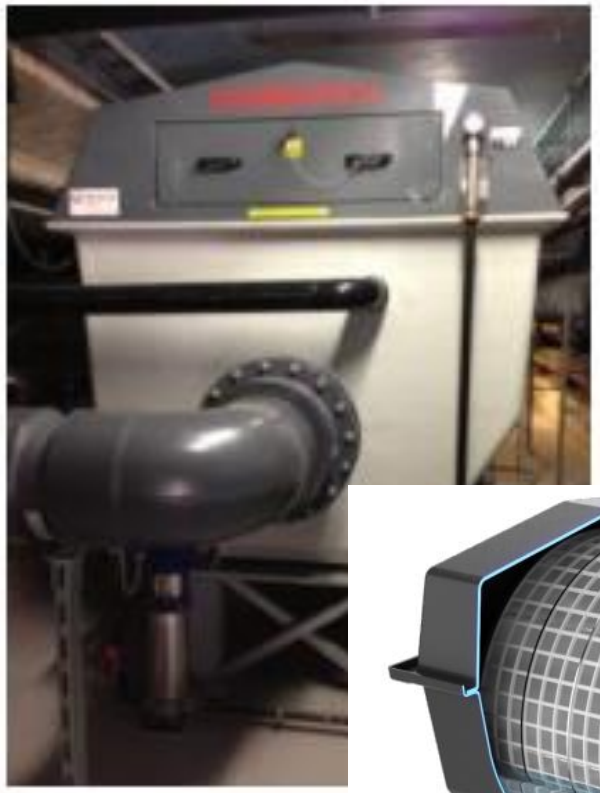
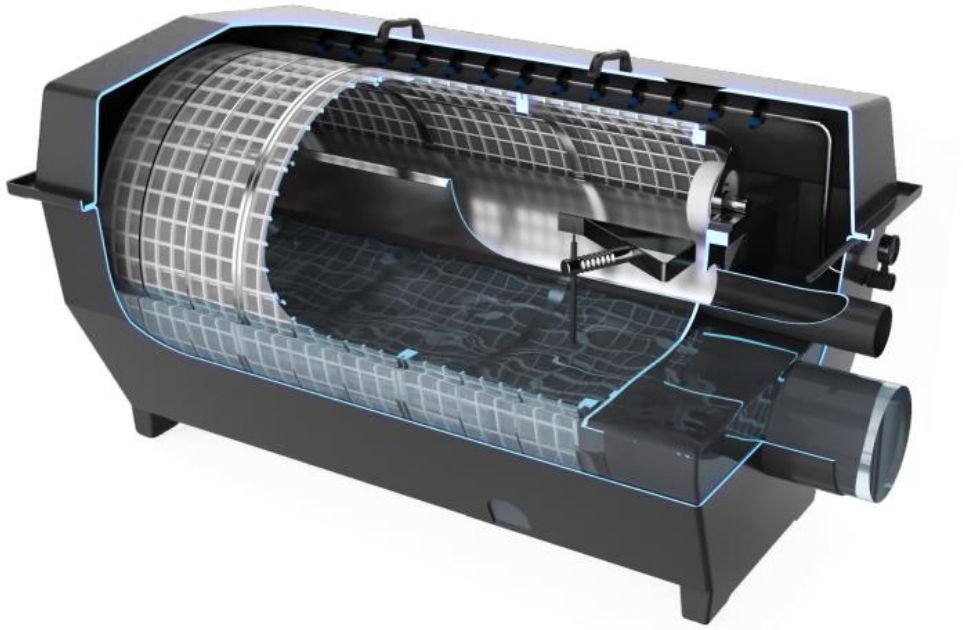
DRUM (IN BLUE)





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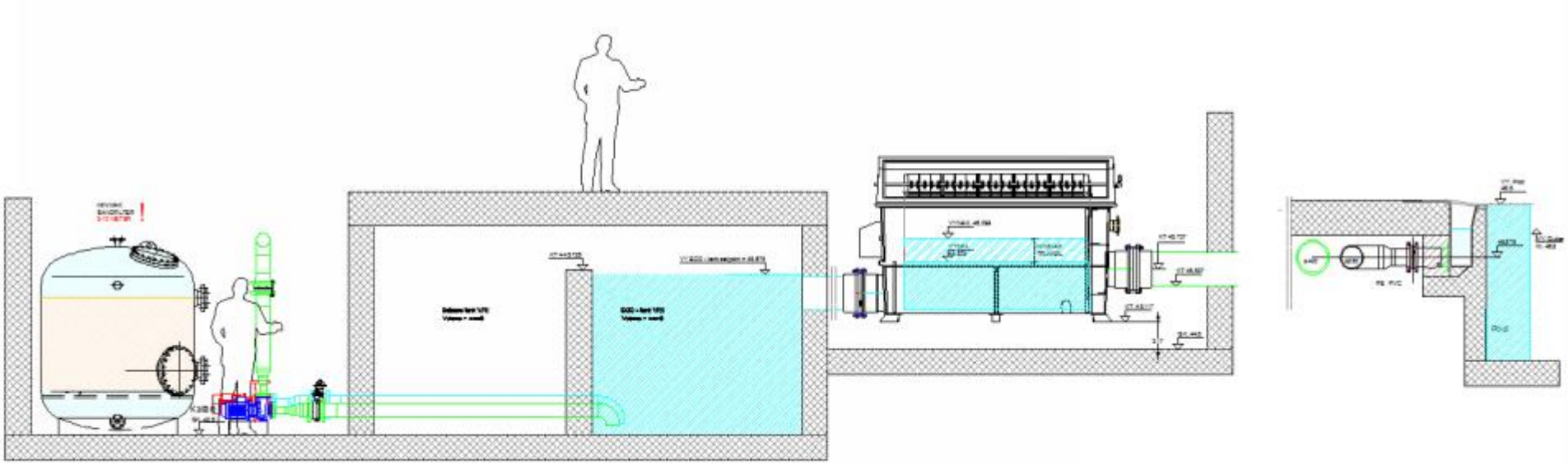
LOW ENERGY POOLS



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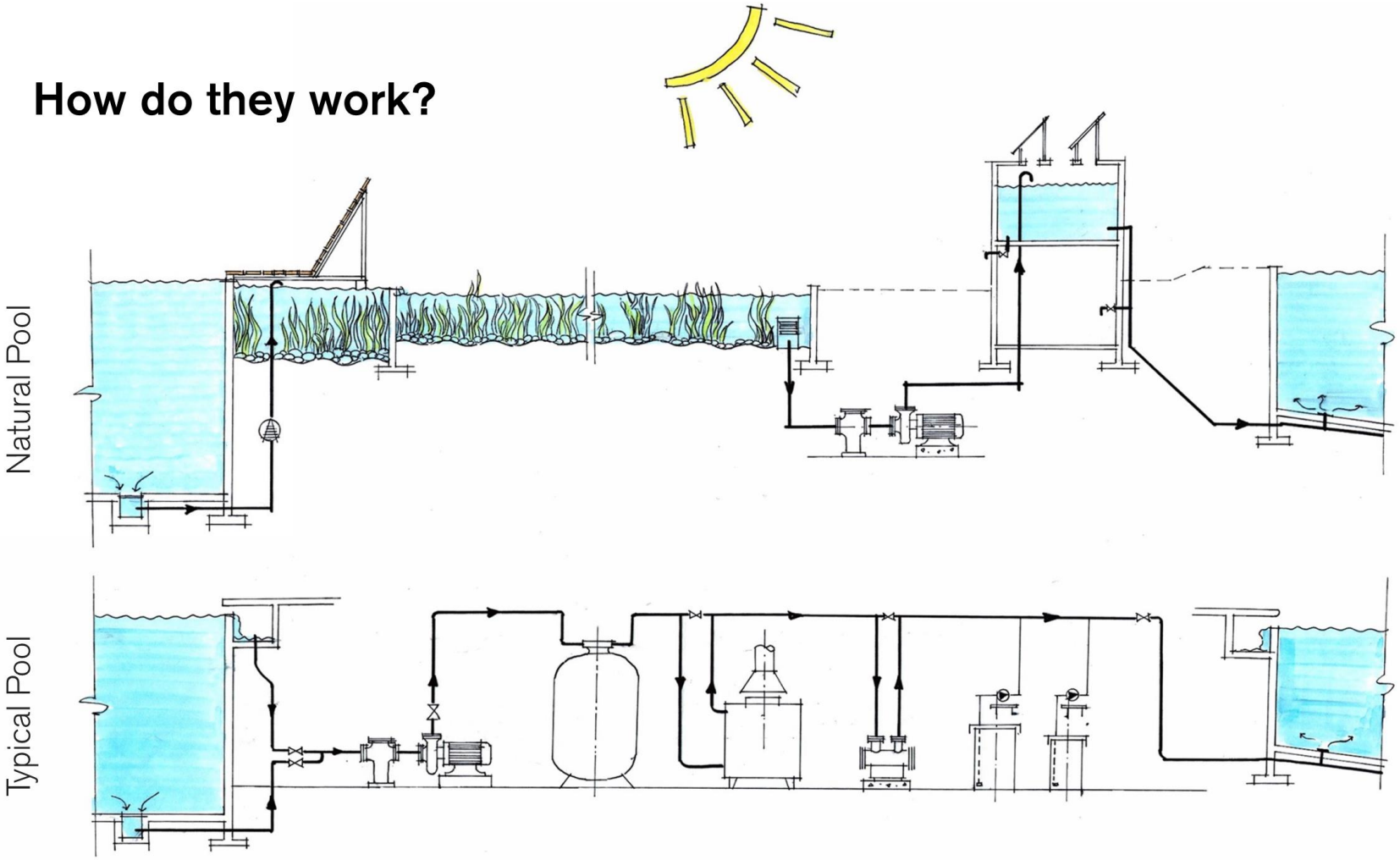
NATURAL POOLS

How do they work?



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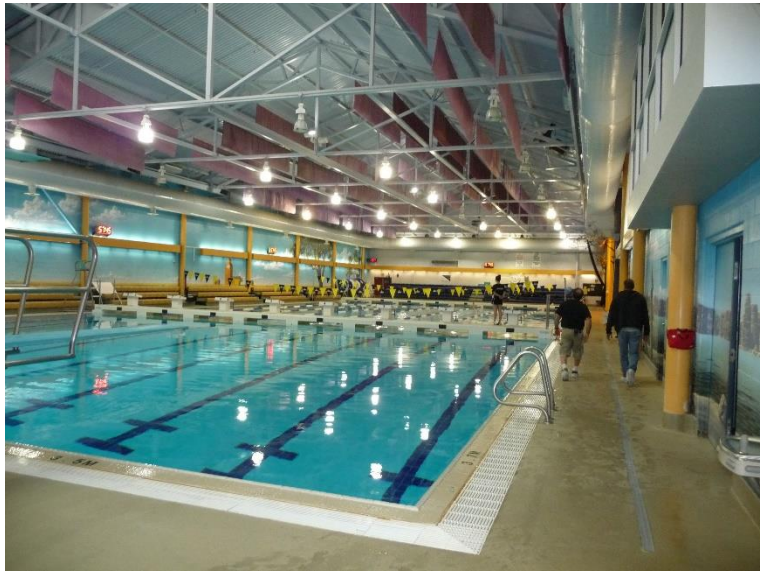
Medicine Hat Family Leisure Centre
Medicine Hat, AB



FILTRATION SYSTEM ENHANCEMENTS

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ACTIVATED GLASS MEDIA

- Direct replacement for sand media
- More resistant to breakdown during backwash cycle → longer lasting
- Slight negative charge which attracts fine particles
- Down to 5 microns filtration with no flocculant

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ADSORBENT MEDIA

- Charcoal media
- Reduction of biofilm
- Results in reduction in Trichloramine and THMs

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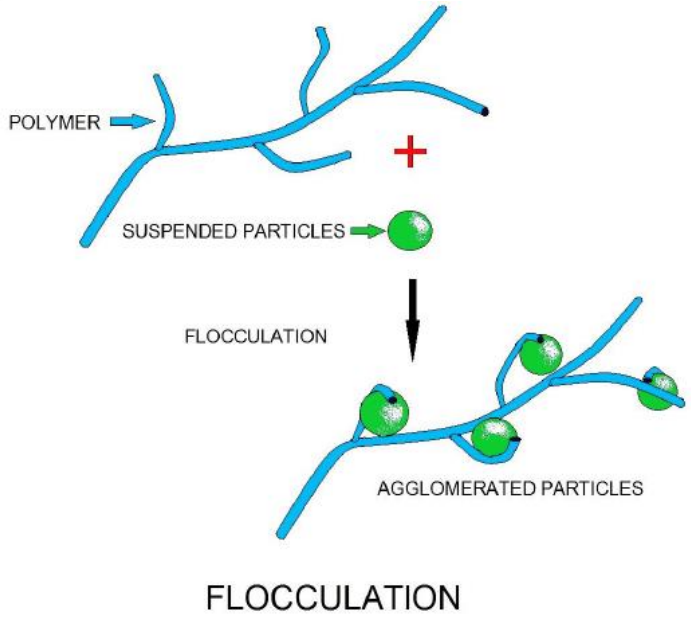
FLOCCULANTS



FLOCCULATION

- Polyaluminum Chloride (PACl) commonly used
- Injected upstream of the filter
- Create larger particles that can be filter out more readily
- Filtration potentially down to 0.1 micron can be achieved
- Often paired with a precipitants or coagulants

CHLORINE DIOXIDE

- Used in various forms in water treatment, but for aquatic applications typically a liquid agent is utilized TCDO (Tetrachlorodecaoxide)
- Kills biofilm which is commonly present in sand filters and piping systems
- Unlike UV, a residual is present so it can be tested

FILTRATION REPLACEMENT

- Retrofit in existing facilities
- Opportunity to increase turnover rate
- Space constraints are a factor, including access into the existing mechanical room
- Backwash constraints are a consideration, addition of backwash sumps may be required

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The Glencoe Club - Calgary, AB

APPROACH TO FILTER SELECTION

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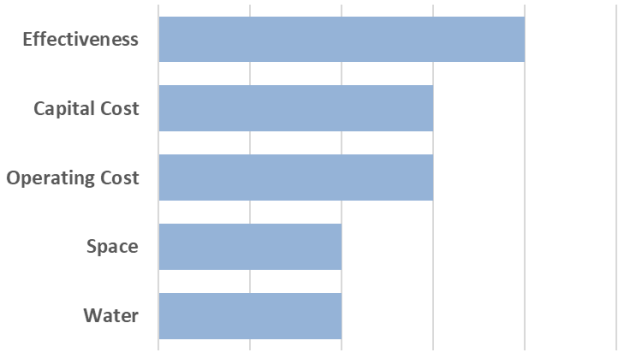
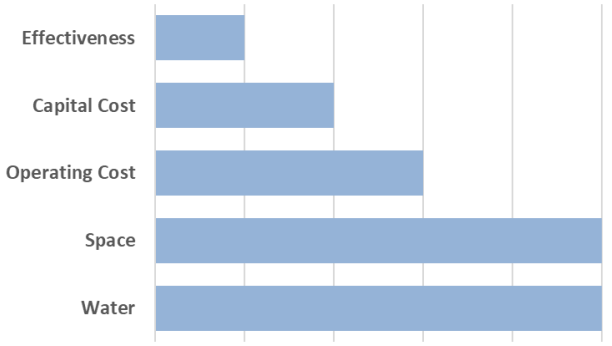
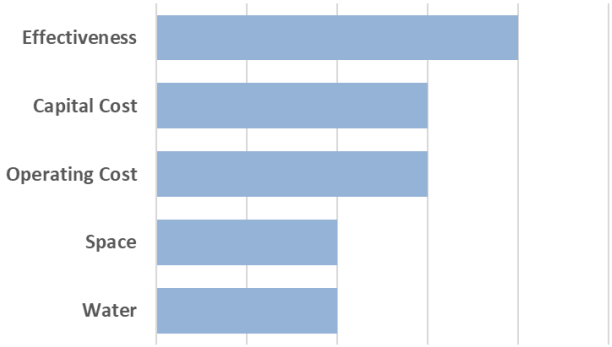
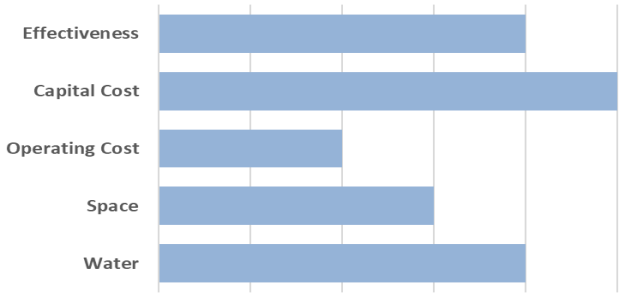
Filter Type	Pros	Cons	Performance	Comments
Vacuum D.E.	• Lowest Energy Required • Very Good Water Quality When Properly Set-Up	• More difficult to maintain/operate •Should be built in a separate room to minimize corrosion		Requires less pump energy than all other options. Requires a qualified operator to complete backwash. Great water quality.
Hi-Rate Sand	• Readily Available • Most Common in North American Market • Easy to Operate	• High Water Use • Lowest Water Quality		Lowest overall maintenance and operational impacts, most common on the market. With newer filter media technology and flocculants, it could provide equal water quality as Regenerative Media.
Pressure Regenerative	• Very Good Water Quality • Requires Small Footprint • Uses the Least Amount of Water • Lowest chemical & energy use	• Sole Sourcing Required • Difficult to repair • High Mechanical Cost •Requires a qualified operator to perform backwashes		Requires the least amount of space, cost neutral and gret water quality

Filter Type	Pros	Cons	Performance	Comments
Multi-Layer Sand	•Best Water Quality in the Market • Long Filter Runs Between Backwashes • Carbon Within the Filer Polishes the Water	• Takes up 2-3 times more space than sand filters • Uses Large Volumes of Water for Backwashing • High Mechanical & Building Cost • Carbon could draw copper out of system thus turning water greenish		
Membrane Filtration	•Excellent Water Quality • Automated Operation • Permanent Media	• Hi Capital Cost • Uses Large Amounts of Water • Not Yet Available in Canada		
Drum In Blue	• Excellent Water Quality • Low Energy Design • Prevents Biofilm Generation	• Not Yet Available in Canada		
Natural Pools	• A Natural Approach • Environmentally Friendly • Low Impact	• Requires Signficant Landscape Design		

THANK YOU!

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