Waste Water Recycling Process: An Active Solution
Greywater Reuse Potential in Completing Water Recycling Loop & Sustainable Water Management

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WHAT IS WATER RECYCLING?

The reuse and recycle of alternative water resources such as sewage water, greywater, wastewater, rainwater and stormwater that can be safely used for intended potable and not-potable water purposes such as irrigation, reservoir water recharge hence conserving and maximising utilisation of high quality municipal treated drinking water for drinking and other personal hygiene applications.
URBAN BUILDINGS WATER REUSE SOURCES

• GREYWATER

🌟 Greywater origins and level of risk/ challenge
- originates from baths, showers, washing machines and washing basins only. Excluding wastewater or black water from toilets, garbage wastes, urinals and kitchens

⚠️ Excluding wastewater or black water from toilets, garbage wastes, urinals

• RAINWATER/ STORMWATER

👍 Water originates from rainfall
WHY GREYWATER REUSE? ADVANTAGES?

- Not dependent on Nature, more reliable of water reuse source than rainwater
- A water scarcity best practicable solution. Viable, sustainable and great alternative water source to alleviate chronic or temporal water shortage.
- Great source of water for reuse applications, not highly contaminated as compared to sewage water/ black water
- Continuous water reuse supply- as long as water is consumed in a premise, greywater will be produced for water reuse purposes
- Reduced treatment requirement and load to wastewater treatment plant. Greywater is reused, black water to wastewater treatment plant
- Water conservation by reducing demand for potable water
PRIMARY WATER PURPOSES IN COMMERCIAL BUILDINGS

• Toilets
• Showers
• Wash Basins
• Kitchens
• Laundry
• Heating, Ventilation, Air Conditioning (HVAC) Systems
• Landscaping
RECOMMENDED GREYWATER REUSE APPLICATIONS
- US EPA, PUB, Australia EPA, Health Canada etc

• INDOOR REUSE
  (NOTE: Dependent on the different levels of treatment and wastewater treatment technology to be used)
  - Toilet and Urinal Flushing
  - Washing Machine and Laundry

• OUTDOOR REUSE
  (NOTE: Dependent on the different levels of treatment and wastewater treatment technology to be used)
  - Subsurface Irrigation
  - Surface Irrigation
  - Water Features and Ponds
  - Building Equipment e.g. Cooling Tower, Chiller, Fire Protection etc
GREYWATER TREATMENT ISSUES, CHALLENGES AND REUSE

PUBLIC HEALTH AND REGULATORY CONCERNS AND CHALLENGES

ECONOMIC AND FINANCIAL BARRIERS

GREYWATER QUANTITIES
- Usable Reuse Volume

GREYWATER QUALITIES
- Contaminated water with food, human mucous, blood, hair, soaps, shampoos, pharmaceutical residuals, hair dyes, toothpaste, body oils & fats, oils & greases, cleaning products, faecal bacteria matters from body cleaning ??
- 3 Main Water Qualities: Physical/Aesthetic, Chemical and Microbiological
## Greywater Sources, Applications and Standards

<table>
<thead>
<tr>
<th>Greywater Source and Risk Level</th>
<th>Water Reuse Applications</th>
<th>Recommended Greywater Reuse Quality</th>
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<tbody>
<tr>
<td><strong>Risk Level 3</strong></td>
<td>Water Reuse Level 4</td>
<td>Minimal or No Treatment Required</td>
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<tr>
<td>Basin and Ablution</td>
<td>Non-Potable Sub- and Surface Irrigation Only</td>
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<tr>
<td><strong>Risk Level 2</strong></td>
<td>Water Reuse Level 3</td>
<td>BOD &lt;10mg/l</td>
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<tr>
<td>Level 3 + Floor Traps + Laundry + Shower</td>
<td>Non-Potable Above Ground Irrigation Only</td>
<td>TSS &lt;10mg/l</td>
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<tr>
<td><strong>Risk Level 1</strong></td>
<td>Water Reuse Level 2</td>
<td>BOD &lt;5mg/l</td>
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<tr>
<td>Level 2 + Pantry + Kitchen</td>
<td>Non-Potable Irrigation + Indoor Toilet Only</td>
<td>TSS &lt;2mg/l</td>
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<tr>
<td></td>
<td>Water Reuse Level 1</td>
<td>Total Coliforms &lt;10mg/l E. Coli &lt;N.D.</td>
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<td>Non-Potable Irrigation + Indoor Toilet + Laundry/ Vehicle + Building Equipment</td>
<td>Total Bacteria &lt; Log 4 Reduction</td>
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</tbody>
</table>

**NOTE:** Primary Classification and Design Considerations

1. Level of Human Contact
2. Level of Physical, Chemical and Microbiological Contamination
3. Level of Treatment Dependent on End Use
MULTI-CORE, MULTI-APPROACH
GREYWATER TREATMENT & REUSE TECHNOLOGIES

PHYSICAL TREATMENT & FILTRATION TECHNOLOGY
- TRASIC/ TRAFIC™ Media Filter Systems
- TWIGA™ Polishing Membrane Systems
- TRIWRO™ Membrane Systems
- TRISEF™ Screen and/or Depth Filtration Systems

PHYSICO-CHEMICAL TREATMENT TECHNOLOGY
- TRICHEM™ Chemical Treatment Systems
- XCEL-BADAOTM -Oxidation and Chemical Treatment Systems
- AQ-BARRIER™ UV Disinfection Systems

BIOLOGICAL TREATMENT & MEMBRANE TECHNOLOGY
- MOBIBCEL™ Aerobic & Anaerobic Treatment System with Bioaugmentation Microorganisms
- TRICONT™ Biomedia Carrier Treatment Technology
- XCEL-MBRTM MBR & TWIGA Polishing Membrane Wastewater Treatment Systems
LOW-MID LEVEL GREYWATER TREATMENT AND REUSE DESIGN 1
Non-Potable Sub- and Surface Irrigation Only
HIGH LEVEL GREYWATER TREATMENT AND REUSE DESIGN 2
All Non-Potable Reuse Applications

TRISEF™ Screen Filter

TRICONT™ Biomedia Carriers

T-SEC-FLEXAIR™ Enhanced Aeration

Bioaugmentation

XCEL-MBR™ / TWIGA™ Membrane Treatment System

TRASIC/ TRAFIC™ Media Filter Systems

TRIMACEL™ Water Monitor & Control System

AQ-BARRIER™ UV System
READY FOR NEXT!
TOTAL GREEN WATER AND WATER REUSE SOLUTION
Question & Answer

• Headache?
• Any question?
• What are the solutions?
• What should we do?
• Any enhancement/best practices not considered?
• And what can I contribute?

FOR MORE INFORMATION
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