Introduction to Advanced Enviro-Septic™
Wastewater Treatment System

Sales & Distribution Contact
Justin DaMore of Morning Star Distribution
Justin@meyersenv.com
585-377-1700 (office)
585-781-4602 (cell)

Technical Assistance
Mike.Carbonneau@presbyeco.com
www.PresbyEnvironmental.com
800.473.5298 x 21

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Required Reading

New York Design and Installation Manual for Advanced Enviro-Septic™

covers topics not presented in this introduction and
must be read by those seeking a complete understanding of the system.
Rethinking Our Future

“A century ago, the average American used only about 10 gallons of water a day to drink, cook, clean, and bathe. Today, Americans use 100 gallons a day per person on average, causing stresses on our sources of drinking water.”

-EPA 2010
Presentation Topics

- Part #1 – Product Introduction
- Part #2 – Product Sizing
- Part #3 - System Configurations
- Part #4 – Installation
Part #1 – Product Introduction

- Testing under stringent US & Canadian standards
- Years of extensive testing in Stokes Canada
- Biomat established in 3 weeks or less
- Operating at less than 30 mg/L TSS & BOD
- NSF 40, class 1 approved
- Currently approved in NH, ME, IN, OH, CT, NY, VA, MA, NJ and VT
System Advantages

- Gravelless, large diameter pipe providing secondary effluent treatment & dispersal
- Provides Unmatched treatment prior to returning liquid to the ground water
- Leach field/Trench sizing is typically 25-60 less than traditional pipe & stone
- Trenches are sized under GSF
- Smaller dispersal area translates to more savings in septic system installation
- Diverse bed/trench configurations to meet most any site constraints
Superior Treatment Results

Testing by ESA, Stoke, Canada
Samples taken 6”-12” below each field

- Verified by independent third party testing
- NSF 40 Class I certified (specific configurations)

<table>
<thead>
<tr>
<th>Tested Item</th>
<th>Effluent Concentrate</th>
<th>After Pipe and Stone</th>
<th>After Enviro-Septic®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>125 mg/L</td>
<td>25 mg/L</td>
<td>2 mg/L</td>
</tr>
<tr>
<td>MPN Fecal Coliforms</td>
<td>3,091,000 per 100 mL</td>
<td>190,000 per 100 mL</td>
<td>2,300 per 100 mL</td>
</tr>
<tr>
<td>Biological Oxygen Demand (BOD)</td>
<td>172 mg/L</td>
<td>21 mg/L</td>
<td>2 mg/L</td>
</tr>
</tbody>
</table>
Treatment Cycle

- Septic tank provides primary treatment
- Loam
- Green Coarse Fibers
- Black Geo-Textile Fabric
- Skimmer
- Bio-Accelerator Fabric Provides Even Distribution
- Corrugated Pipe
- Ridges
- Air Void
- Scum
- Effluent
- Sludge
- System Sand
- Treated Leachate

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AES Components

24 Sq Ft Surface Area per linear foot of pipe
Part #2 – System Sizing

Up to 25-60% smaller sand bed area resulting in:

• Less material cost
• Less impact to site
• Less construction time
• Overall cost savings to home owner
Advanced Enviro Septic vs Pipe & Stone

Pipe and stone footprint

Enviro-Septic® footprint
New York Sizing

- Amount of AES pipe is based on volume of water and wastewater strength
- Residential bed systems will use a minimum of 70 linear feet per bedroom
- Non-residential systems are sized according to BOD & TSS levels
- Sizing of the bed ‘Footprint’ is based on the conservative Tyler Table model for wastewater strength less than 30mg/L.
### TABLE A – Residential Trench Length Required
New & Replacement Systems

<table>
<thead>
<tr>
<th>Percolation Rate (MPI)</th>
<th>2 Bedroom</th>
<th>3 Bedroom</th>
<th>4 Bedroom</th>
<th>5 Bedroom</th>
<th>6 Bedroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>42</td>
<td>60</td>
<td>63</td>
<td>88</td>
<td>80</td>
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<tr>
<td>330</td>
<td>50</td>
<td>66</td>
<td>76</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>390</td>
<td>56</td>
<td>81</td>
<td>83</td>
<td>111</td>
<td>102</td>
</tr>
<tr>
<td>450</td>
<td>63</td>
<td>89</td>
<td>94</td>
<td>125</td>
<td>115</td>
</tr>
<tr>
<td>660</td>
<td>71</td>
<td>93</td>
<td>107</td>
<td>143</td>
<td>131</td>
</tr>
<tr>
<td>780</td>
<td>83</td>
<td>108</td>
<td>125</td>
<td>167</td>
<td>153</td>
</tr>
<tr>
<td>900</td>
<td>100</td>
<td>110</td>
<td>130</td>
<td>200</td>
<td>183</td>
</tr>
</tbody>
</table>

### TABLE B - AES Remediation & Replacement System Sizing
Minimum System Sand Bed Area (sq. ft.) & AES Pipe Requirements (ft.)
(Note: Shaded portions of table will require bed size to be increased in order to accommodate AES pipe)

<table>
<thead>
<tr>
<th>Perc Rate (mpl)</th>
<th>2 Bedroom</th>
<th>3 Bedroom</th>
<th>4 Bedroom</th>
<th>5 Bedroom</th>
<th>Per Each Add'l Bedroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 7</td>
<td>188</td>
<td>281</td>
<td>375</td>
<td>469</td>
<td>94</td>
</tr>
<tr>
<td>8 to 10</td>
<td>214</td>
<td>321</td>
<td>429</td>
<td>536</td>
<td>107</td>
</tr>
<tr>
<td>11 to 15</td>
<td>300</td>
<td>450</td>
<td>600</td>
<td>750</td>
<td>150</td>
</tr>
<tr>
<td>16 to 20</td>
<td>333</td>
<td>500</td>
<td>667</td>
<td>833</td>
<td>167</td>
</tr>
<tr>
<td>21 to 30</td>
<td>433</td>
<td>650</td>
<td>867</td>
<td>1083</td>
<td>217</td>
</tr>
<tr>
<td>31 to 45</td>
<td>520</td>
<td>780</td>
<td>1040</td>
<td>1300</td>
<td>260</td>
</tr>
<tr>
<td>46 to 60</td>
<td>578</td>
<td>867</td>
<td>1156</td>
<td>1444</td>
<td>289</td>
</tr>
<tr>
<td>61 to 80</td>
<td>650</td>
<td>975</td>
<td>1300</td>
<td>1625</td>
<td>325</td>
</tr>
<tr>
<td>81 to 100</td>
<td>867</td>
<td>1300</td>
<td>1733</td>
<td>2167</td>
<td>433</td>
</tr>
<tr>
<td>101 to 120</td>
<td>1300</td>
<td>1950</td>
<td>2600</td>
<td>3250</td>
<td>650</td>
</tr>
</tbody>
</table>

Minimum AES pipe required: 140 ft., 210 ft., 280 ft., 350 ft., 70 ft. per add'l bedroom
### User Friendly Sizing Tables, Continued

<table>
<thead>
<tr>
<th>Percolation Rate (MPD)</th>
<th>Application Rate (Gallons/Day/Sq Ft)</th>
<th>2 Bedroom</th>
<th>3 Bedroom</th>
<th>4 Bedroom</th>
<th>5 Bedroom</th>
<th>6 Bedroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5</td>
<td>0.95</td>
<td>316</td>
<td>347</td>
<td>411</td>
<td>474</td>
<td>547</td>
</tr>
<tr>
<td>6 to 7</td>
<td>0.80</td>
<td>375</td>
<td>412</td>
<td>488</td>
<td>563</td>
<td>650</td>
</tr>
<tr>
<td>8 to 10</td>
<td>0.70</td>
<td>423</td>
<td>471</td>
<td>557</td>
<td>643</td>
<td>829</td>
</tr>
<tr>
<td>11 to 15</td>
<td>0.60</td>
<td>500</td>
<td>550</td>
<td>650</td>
<td>750</td>
<td>1000</td>
</tr>
<tr>
<td>16 to 20</td>
<td>0.55</td>
<td>546</td>
<td>600</td>
<td>709</td>
<td>818</td>
<td>1100</td>
</tr>
<tr>
<td>21 to 30</td>
<td>0.45</td>
<td>667</td>
<td>733</td>
<td>867</td>
<td>1000</td>
<td>1444</td>
</tr>
<tr>
<td>AES Required</td>
<td></td>
<td>140</td>
<td>210</td>
<td>280</td>
<td>350</td>
<td>420</td>
</tr>
</tbody>
</table>

*(Note: Shaded portions of table will require bed size to be increased in order to accommodate AES pipe)*

See plan section for design layout options.
Part #3 - System Design & Configurations

• Sloping versus level beds
• Curved
• Combination of all layouts
• Pressure Distribution not required or allowed
Sloping versus Level Beds

Sloping beds reduce impact to site and save fill

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Level vs Sloping field

Pipe Layout
Width
3' Side Slopes
Fill Extensions
(3) Sides

4" Min Topsoil
Pipe Layout Width
5' Fill Extension

6" Min

3' Min System Sand Extension

12" Min. of System Sand Below & 6" Over Pipe
System Sand Extension

Alternate Fill Extension
(5) Sides

DO NOT PLANT ANY DEEP ROOTED VEGETATION ON FINAL GRADES

Remove all organics (not topsoil) and properly prepare surface before placing system sand or sand fill. See section "M" for details.

All AES pipes laid level (end to end) ±1/2" 12" Min. of system sand below & 6" over pipe
System Sand Extension

Additional Sand Fill to be Purchased

Existing Grade >10% Sand Fill

SAND FILL

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Curved Beds

RAISED CONNECTIONS

12" MINIMUM OF SYSTEM SAND AROUND PERIMETER OF PIPE

LOW VENT

RADIUS

INLET

EXISTING DRIVEWAY

RADIUS

EXISTING DRIVEWAY

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Avoid Obstacles

- **Building or Obstacle**
- **6' Radius Min**
- **System Sand Extension**
- **Inlet**
- **System Sand Extension Required for Slopes Over 10%**
- **30' Minimum Line Length**
- **Low Vent**
- **12'' Min of System Sand Around Perimeter of Pipes**
Real life used of Curved System
Sloping & Curved

AES Rows Sloping & Curved to match terrain
Popular Bed Configurations

- Basic Serial System
- Combination System
- Distribution Box Systems
- Multiple Bed System
- Mound System
- Level & Sloping Trenches and Leachfield
Basic Serial System

Isolation Distances Measured from Tall Portion of Sand

0%-10% System Slope - Rows Grouped in Center of System Sand Bed Area
10%-20% System Slope – Rows Grouped at the highest contour of System Sand Bed Area

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Combination systems utilized by designer preference or to divide daily flow
Level Field – Rows centered in System Sand
Sloping field – Rows oriented at High Contour of System Sand

Isolation Distances Measured from Tall Portion of Sand
Multiple Bed System

BUTTERFLY CONFIGURATION BASIC SERIAL DISTRIBUTION
(EQUAL LINEAR FOOTAGE REQUIRED IN EACH BED)

Typically used for challenging sites with high Linear Loading Rate or Application Rates of greater than 900 GPD
Mound System - Sloping

System rows grouped at high contour for System sloping > 10%
Remove ALL organics and roots from areas to receive System Sand & Sand Fill

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Elevated – Sloping Over 10% End View

3’ System Sand and 5’ fill Extension for all beds sloping over 10%

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System Restrictions

• System placed on 1-60 MPI soils
• Higher perc rate soils with waiver
• System must be vented
• Must be at least 6” of System Sand Above, Below and Around Advanced Enviro-Septic Pipe
• Distribution box and Velocity reducer required with all pump systems
• Flow equalizers required when dividing flow
What is System Sand?

The System Sand acts as the “lungs” of the field. Fine sands, silt & clay retain water, restricting air flow.

ASTM C-33 (Concrete Sand) with 2% or less passing a #200 sieve can be used as System Sand (pg 9 QR).

** #200 value obtained by washing the sample **
Part #4 – Site Preparation & Installation

- Raised Connection
- Offset Adapter
- Coupling
- System Sand Extension
Site Preparation

• Remove all organics and sod from areas to receive System Sand or Sand Fill
• Mold Board Plow receiving layer prior to placing System Sand and Fill Sand
• Place System Sand & Fill Sand immediately after excavating the receiving area.
• Divert surface water with subtle swales from running into or over system during construction
• Do not work wet or frozen soils
1. Pull fabric back to expose at least two corrugations.

2. Place coupling under pipe capturing two corrugations on each pipe (if possible).

3. Clamp coupling.

1. Pull fabric back to expose corrugations.
2. Place offset adapter over end of pipe & push until the locking tabs engage corrugations.
3. Orient hole at the 12 o’clock position
Field Assembly

- **Advanced Enviro-Septic™ orientation**
  - Seam in 12:00 O’clock position
  - Bio-Accelerator fabric in 6:00 O’clock position
Field Assembly - Cutting AES Pipe

1. Cut fabric with sharp utility knife or commercial grade shears.

2. Use saw or utility knife to cut pipe.
Rules for Rows

- Geo-textile fabric seam (12 o’clock) position, Bio-Accelerator™ fabric (6 o’clock) position

Label noting “This Side Up”

Install with Geo-textile fabric seam at top

Install with Bio-accelerator™ fabric at bottom
Rules for Rows continued

- 100’ maximum row length per bed
- 70 GPD per bedroom typical sizing
- Maximum application rate is 2 GPD/Square Foot

ROW 1

ROW 2

RAISED STRAIGHT CONNECTION

SIDE VIEW

TOP VIEW

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Raised Connection Assembly

- Raised Connection Between Rows
- Geotextile
- Randomly Oriented Fiber Mat
- Enviro-Septic Pipe
- Offset Adapter
- Level
- 2"-4" Offset

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Minimum Drop to Pipe – The 2” Rule

This could be a septic tank.

Raised Connection

There must be a minimum 2” drop in elevation to the AES pipe.
Use grade stakes to hold pipe during backfill.
Field Assembly – Row Spacing

- WOODEN FRAME
- BERM SAND AT BASE OF ENVIRO-SEPTIC PIPES TO HOLD IN PLACE
- REBAR FRAME
Backfilling

Sprinkle a little sand on top of each pipe to hold in place then backfill between them.

Sand against the pipe in several spots to hold pipe in place.
Backfilling - Eliminate Sand Voids

- No mechanical compaction allowed
- 6” minimum of System Sand over AES pipes
- 4” of topsoil over System Sand
Sales & Distribution

• Morning Star Distribution
  Justin Da More
  Justin@morningstardist.com

Technical Assistance

Mike.Carbonneau@presbyeco.com
  800-473-5298
  603-837-5298 fax
Locations to Purchase PEI products

- Morning Star Distribution – Rochester NY
- All Kistner Concrete Locations
- Check PEI Website for new location to come
Presby Certification

Designers and Installers must successfully pass the open book assessment test prior to submitting or installing AES systems.

PEI strongly recommends that all individuals involved in the approval, permitting or inspection process take the assessment test to become certified.

All training, site assessment and technical assistance is provided free of charge!!!