ON-SITE WASTEWATER SYSTEM

Selection Guide • Treatment Efficiency • Installation • Maintenance Summary

SENSITIVE RESOURCES AND SITE CONSTRAINTS	SYSTEM TYPE AND TREATMENT LEVEL																
	Single pass sand filter	Puraflo Peat Biofilter	Ultra Violet Light	Recirculating Sand Filter	Advantex Textile Filter	Nitrex	RUCK (MA)	Composting w/ dosed greywater	FAST	Septitech D	Bioclere	N. Singulair DN	Cromaglass	Waterloo	Amphidrome	N. Singulair / JET	White Knight	Conventional
	T2C	T2C	T2C	T2N	T2N	T2N[15]	T2N	T2N	T2N	T2N	T2N	T2N	T2N	T2N	T2N	T1S[12]	T1S[12]	T1P[11]
Pathogen Sensitive Drinking water reservoirs *, wellheads, shellfishing zones and swimming areas.	Suitability Rating**																
	H+[10]	H+[10]	H+	H [1,10]	H[1,10]	P[15]	H	H[1]	M	H[1,10]	M	M	M	H[1,10]	H[1,10]	P	P	P
Nitrogen Sensitive Wellheads, poorly flushed coastal waters, shellfish areas and sensitive habitat.	M[1]	M[1]	n/a	H+[1,10]	H[1,10]	H+[15]	H	H[1]	H	H[1,10]	H	H	H	H[1,10]	H[1,10]	P	P	P
Slowly Permeable Soils	H+[10]	H+[10]	n/a	H+[10]	H+[10]	H	H	H[1]	M	H+[10]	M	M[1]	H	H+[10]	H+[10]	M	M	P
Shallow Depth to groundwater, bedrock, or other limiting layer.	H+[9,10]	H[10]	H+[13]	H[9,10]	H[10]	H	H	H[1]	M	H[10]	M	M[1]	H	H[10]	H[10]	M	M	P
Rapidly Permeable Soils	H+[10]	H+[10]	H+[13]	H+[10]	H+[10]	H	H	H[1]	M	H+[10]	M	M[1]	H	H+[10]	H+[10]	M	M	P
Size Restricted Lots. Drainfield Size Reduction Permitted	H[1,9]	H[1]	H+[13]	H[1,9]	H[1,10]	H	H	H	H	H[1,10]	M	H	H	M[1,10]	M[1,10]	H	H	P

Suitability Rating: ***H*** *= Highly suitable,* ***M*** *= Moderately suitable,* ***P*** *= Poorly suitable*

Treatment Standards: ***T1P*** *= Primary treatment,* ***T1S*** *= Secondary treatment,*
T2 *= advanced treatment for Nitrogen or Coliform bacteria*

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SYSTEM TYPE AND TREATMENT LEVEL																		
INSTALLATION	Single pass sand filter	Puraflo Peat Biofilter	Ultra Violet Light	Recirculating Sand Filter	Advantex Textile Filter	Nitrex	RUCK (MA)	Composting w/ dosed greywater	FAST	Septitech D	Bioclere	N. Singulair DN	Cromaglass	Waterloo	Amphidrome	N. Singulair / JET	White Knight	Conventional
	T2C	T2C	T2C	T2N	T2N	T2N[15]	T2N	T2N	T2N	T2N	T2N	T2N	T2N	T2N	T2N	T1S	T1S	T1P
A. Estimated Costs [2] 1 = $6 – 11,000 2 = $10 – 14,000 3 = $14 – 18,000 4 = $18 - 25,000+	3	3	< $1,000	3	3-4	3-4[16]	4	3-4	3	3	3-4	2	3-4	3-4	3-4	2	1	1 - 4
B. Ease of Retrofit 1 = straightforward 2 = more complicated 3 = impractical	1	1	2	2	1	1-2	1	3[3]	1	1	1	1	1	1	1	1	1	1-2
OPERATION & MAINTENANCE																		
A. Estimated Annual Costs (RI) (electric @ $.15 kwh)	$48	$48	$35	$70	$70	-0-[17]	$48	$120	$325	$420	$180	$250	-	$70	-	$250	$35	- 0 -[5]
B. Estimated Yearly Inspection and Maintenance costs (RI) (includes an assumed pumpout every three years) [6]	$250	$200	$100 (lamp replacement every 2 years)	$275	$400	$200[18]	$410	$375	$425[7]	$370[7]	$375	$200[7]	-	$320	-	$200[7]	$150	$125[7]
C. Maintenance Frequency (times /year) [8]	1	1	1-3[14]	2	1	1	4	3	2	1	2	2	-	1- 2	2	2	1	1

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SENSITIVE RESOURCES AND SITE CONSTRAINTS	DRAINFIELD TYPE AND TREATMENT LEVEL											
	Trenches	Flow Diffusers	Galleys	Eljen In-Drains	Shallow Narrow	PIP pipe/ Poly drain pipe	Infiltrator Quick 4	Geomat 1200	Geomat 3900	Bottomless Sand Filter	Geoflow Drip	Perc-Rite Drip
	Conventional Options				Alternative Options							
Pathogen Sensitive Drinking water reservoirs *, wellheads, shellfishing zones and swimming areas.	Suitability Rating**											
	M	M	P	M	H+	H+	H+	H+	H+	H	H+	H+
Nitrogen Sensitive Wellheads, poorly flushed coastal waters, shellfish areas and sensitive habitat.	P	P	P	P	H+	H+	H+	H+	H+	M	H+	H+
Slowly Permeable Soils	M	P	P	M	H	H	H	H	H	H	H	H
Shallow Depth to groundwater, bedrock, or other limiting layer.	P	P	P	P	M	M	M	H	H	H	H	M
Rapidly Permeable Soils	P	P	P	M	H	H	H	H	H	H	H	H
Size Restricted Lots Drainfield Size Reduction Permitted	P	M	M	M	H	H	H	H	H+	H+	P	P
Maintenance Frequency (times / year)	0	0	0	0	1	1	1	1	1	1	2	2

Notes on Summary Table

* Drinking water supply reservoirs and other freshwater bodies are also considered phosphorus-sensitive.

** Actual selection of advanced treatment technology should be based on site-suitability and location. In critical areas consider resource protection priority and existing water quality conditions, vulnerability to impact, existing pollution risks, and future threats.

+ Denotes that the system is particularly well suited for the application. NOTE: Estimates based upon a three bedroom home design.

[1] The use of a shallow narrow (12" wide X ≤ 12" deep) pressurized, time dosed trench in native soil is expected to enhance removal of nitrogen, phosphorus, and pathogens. This may improve the suitability of these systems and result in a higher suitability category. Shallow narrow drainfields further reduce drainfield size and increase siting flexibility.

[2] Construction costs are estimates that include everything from the building sewer to the drainfield. Engineering costs are not included. The actual cost will vary according to specific site conditions. Cost estimates do not include siting, permitting, design and construction inspection services.

[3] These systems require the home plumbing to be segregated into gray and black water waste streams. This may not be economically feasible with existing homes.

[4] Approximately 75% of RI RUCK installations use pumps but these systems may be designed as gravity flow systems where natural topography or fill allows gravity flow. If a pump is not used, then there would be no yearly electric cost.

[5] A conventional system with a pressure dosed drainfield would have an approximate electrical cost of $20- $50 per year.

[6] The cost of septage pumpout is estimated at $150. Pumping frequency should be based on inspection and actual need for pumping. Pumping frequencies can vary considerably, depending upon tank size, number of occupants, and life style.

[7] These costs would be $50 - 125 more if a pressure dosed (pumped) drainfield is used.

[8] After a startup period of the first six months the system should be looked at according to the frequency given. During initial system startup, 1 to 4 visits may be needed to adjust the system to the specific home. Those initial visits are normally part of the initial cost of the system.

[9] Single Pass and recirculating sand filters receive a 1-foot reduction in separation distance to groundwater in RI.

[10] System is time dosed using a programmable timer. These systems store peak flows and meter wastewater out over a longer time period. This maximizes treatment potential.

[11] T1P = primary treatment in a conventional system septic tank. Additional treatment will occur in a conventional system drainfield that would reduce effluent levels to or exceeding T1S levels.

[12] T1S = secondary treatment.

[13] In pathogen sensitive areas ultraviolet light disinfection should be used with category 2 technologies discharging to conventional drainfield.

[14] Wiping UV crystal needed 1 time / year with Category 1 and 2-3 times / year with Category 2 technologies.

[15] This system requires another technology system immediately before it that effectively nitrifies the wastewater (converts ammonium-N to nitrate-N). Pathogen removal may be done in treatment components placed before the Nitrex unit.

[16] The cost is for the Nitrex component only; it does not include any other component in the treatment train – additional cost needs to be added for nitrification component.

[17] A gravity flow design, and no electricity is needed for this component. Other components in the treatment train may require electricity.

[18] Quarterly sampling and monitoring of treatment performance required in Massachusetts – this would add to annual operation cost.