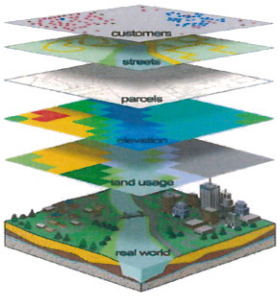


Fremont County Planning and Rural Addressing
Room 360 Court House
450 N 2nd St
Lander, Wyoming 82520
(307) 332-1077
www.fremontcountywy.gov

Wyoming Department of Environmental Quality/Water Quality Division
122 West 25th Street, Herschler Building - 4W
Cheyenne, WY 82002

June 5, 2015

Please find enclosed the comments of the Fremont County Planning and Rural Addressing Small Wastewater Specialists Marcel Lopez and Steve Warner on the proposed Chapter 25 Small Wastewater Regulations.

Our Specialists look forward to your responses.

Thank you again for giving us the opportunity to comment.

Steve Baumann
Director, Fremont County Planning and Rural Addressing

Cc: Steve Warner
Marcel Lopez

FREMONT COUNTY PLANNING DEPARTMENT
ROOM 360 COURTHOUSE, 450 N 2ND STREET
LANDER, WYOMING 82520
(307) 332-1077 or (307) 857-369

Comments Pertaining to Wyoming Department of Environmental Quality Chapter 25 Submitted By Fremont County, WY Planning Department

Commentary By:

Steve Warner, Fremont County Small Wastewater Specialist
Marcel Lopez, Fremont County Small Wastewater Specialist

The following comments are offered by Steve Warner (**SW**) and Marcel Lopez (**ML**):

1. **SW & ML:** The following definitions are missing and should be added to **Section 2 Definitions**.: Distribution box, Serial distribution, and Soil exploration pit. These terms are used in the regulations themselves and should be included so that everyone understands their meaning.

2. **SW & ML**: **Section 4 Design Flows.** Fremont County feels that an unfinished basement should not be automatically considered as two additional bedrooms. One bedroom is more appropriate. Perhaps this should be considered on a case-by-case basis.

3. **ML:** In **Section 4 Design Flows.** A discrepancy was discovered in **Table 1** indicates a flow rate of 550 gpd for a five (5) bedroom home.

Table 1. Residential Design Flow Rates per Bedroom (gallons per day, gpd)[1]

1 bedroom	150
2 bedrooms	280
3 bedrooms	390
4 bedrooms	470
5 bedrooms	550
6 bedrooms	630

[1]An unfinished basement is considered two (2) additional bedrooms.
[2]The design flow shall be increased by eighty (80) gpd for each additional bedroom over six (6).

While in **Section 9, (a)(iii) (A)** the minimum liquid volume of a septic tank shall be 1000 gallons for residences up to a four (4) bedroom capacity. Additional capacity of 150 gallons per bedroom shall be provided for each bedroom over four (4).

This seems to produce a discrepancy with Chapter 11; a four (4) bedroom home is rated at 600 gpd. Why can't a 1,000 gallon tank be used for a five (5) bedroom home in Chapter 25? Another discrepancy appears in **(A)** which states, *"additional capacity of 150 gallons per bedroom shall be provided for each bedroom over four (4)."* **Table 1** shows an addition of

eighty (80) gpd wastewater flow from four (4) to five (5) bedrooms as well as five (5) to six (6). Can these both be correct?

4. **SW & ML: Section 6 Site Suitability.** Requires every project have a soil exploration pit. It is the belief of Fremont County that a soil exploration pit is not always necessary. Previous permits from neighboring properties on the same soil type along with NRCS soil surveys can and are used to help make determinations. Exploration pits can be helpful in many instances to verify soil conditions.

5. **SW:** Under **Section 9 (iv) Septic Tanks/Configuration.** A single compartment tank cannot be effectively partitioned in the field.

6. **ML:** This same section states that, *"The tees or baffles shall extend above the liquid level a minimum distance of six (6) inches."* I set up the current program to cast tanks at Rocky Mountain Pre-Mix in Riverton, WY, and have worked in and around the industry for thirty years, designing and installing septic systems and casting septic tanks. I am unaware of any tanks, pre-cast or poly that provide that much space above either the inlet or outlet. The cast tanks available in Fremont County have three (3) inches above the outlet baffle and even less on the inlet to the underside of the lids. The per-cast tanks in Fremont County also have a cast in baffle on the inlet end that extends down two (2) feet having a cut-out to provide for venting of gasses. Also I frequently see inlet tees that are full of floaters, and if you extend the tee up six(6) inches I believe you are creating a potential for blockage. I feel that DEQ should trust the experts in the field and with the companies that manufacture tanks as to what works. These companies have spent thousands of dollars on R&D. Please see attached septic tank specification sheets and photos.

7. **SW & ML:** Under **Section 11,(a) (vi) F Standard Soil Absorption Systems.** Trenches cannot be used in soils that percolate greater than 60 mpi. **(viii) C** calls for inspection ports. Helpful, but should be optional. **(viii) F** Same comment regarding 60 mpi soils and trenches.

8. **SW & ML:** Under **Section 14(a) (i) Small Wastewater Lagoons.** Fremont County believes the 100 ft. setback severely restricts the installation of ponds as an option on many property parcels. Not everyone has that kind of space to work with. Under **(b) (xiv)** there is no mention about fence height and Fremont County believes that there needs to be a minimum fence height requirement for safety purposes.

Fremont County is concerned about the sizing formula found in **(b) (vii)**. It has been our observation that many projects are too large in size when using the DEQ formula, resulting in freeze problems in the winter and lack of working volume in the summer. The department has sought variances with DEQ utilizing a mass balance approach and partition dike in order to retain more water in the lagoon to allow it to function properly. Managing the amount of wastewater contained in the lagoon has been achieved with good results. Fremont County Planning is asking DEQ to consider adopting this form of construction in Chapter 25.

9. **SW & ML:** Under **Section 16 Grey water Systems/Disinfection.** Fremont County would like to know who is would be responsible for doing bacterial counts? This would be costly and not very practical at the county level.

10. **SW & ML:** Under **Section 17 Operation and Maintenance.** Why does the waste have to go to a permitted wastewater treatment facility? It is the department's understanding that compost from these toilets is safe and meant to be applied on the ground.

11. **SW & ML:** Under **Appendix A Section 2(a) (ii)** As stated in point #4, not all projects need a soil exploration pit.

12. General: Fremont County has noted the omission of constructed wetlands as an alternative when working with slow percolating soils. Currently, Fremont County with local direction from regional DEQ, permits engineered constructed wetlands when conditions or personal preference do not allow the use of wastewater lagoons. The local DEQ has developed a design for the sizing and installation of these wetlands. This means of wastewater disposal has been found to be very effective in the state of Colorado including installations at elevations above 9,000 ft. Fremont County has found engineered constructed wetlands to be a viable system and an effective alternative under certain conditions and would like to encourage DEQ to recognize these systems while setting up appropriate guidelines. See attached article from "Small Flows Quarterly".

Respectfully Submitted,

Steve Warner
Small Wastewater Specialist

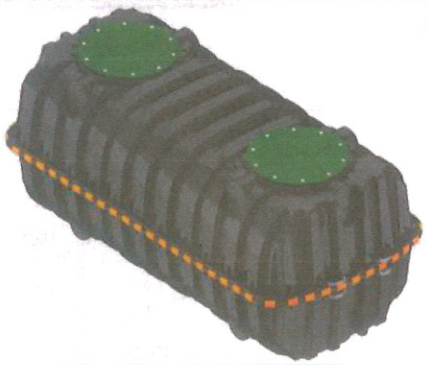
Marcel Lopez
Small Wastewater Specialist

Attachments

1. Infiltrator IM-1060 septic tank specification sheet.
2. Wind River Ready Mix Model 1000 septic tank specification sheet.
3. Snyder Dominator pre-plumbed 1000 septic tank
4. Photographs
5. Small Flows Quarterly Constructed wetlands article.

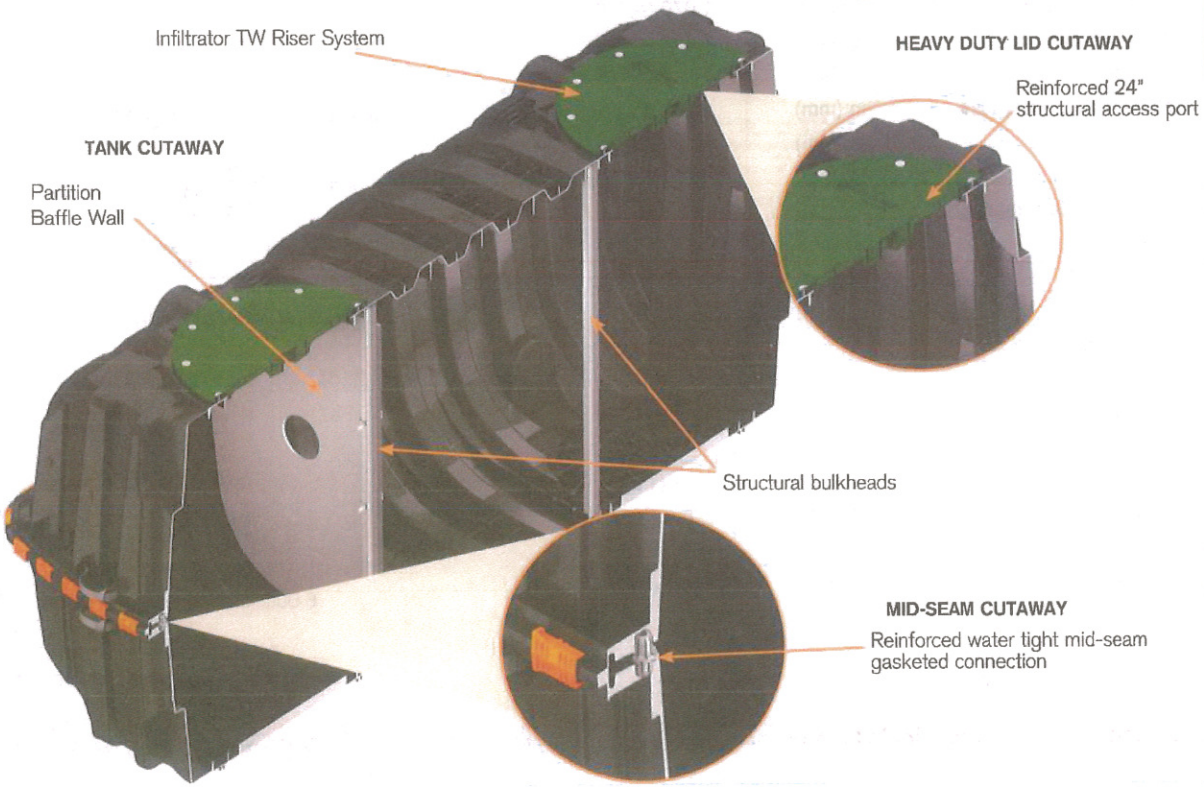
INFILTRATOR®
septic tanks

IM-1060

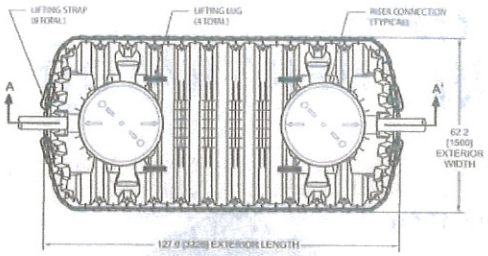


The Infiltrator IM-1060 is a lightweight strong and durable septic tank. This watertight tank design is offered with Infiltrator's line of custom-fit risers and heavy-duty lids. Infiltrator injection molded tanks provide a revolutionary improvement in plastic septic tank design, offering long-term exceptional strength and watertightness.

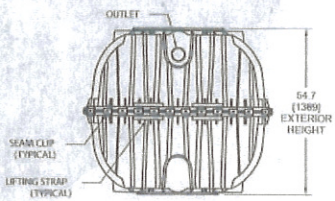
- Strong injection molded polypropylene construction
- Lightweight plastic construction and inboard lifting lugs allow for easy delivery and handling
- Integral heavy-duty green lids that interconnect with TW™ risers and pipe riser solutions
- Structurally reinforced access ports eliminate distortion during installation and pump-outs
- Reinforced structural ribbing and fiberglass bulkheads offer additional strength
- Can be installed with 6" to 48" of cover
- Can be pumped dry during pump-outs
- Suitable for use as a septic tank, pump tank, or rainwater (non-potable) tank



IM-1060 General Specifications and Illustrations

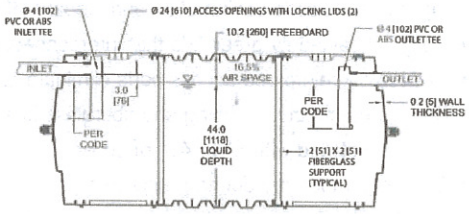


TOP VIEW



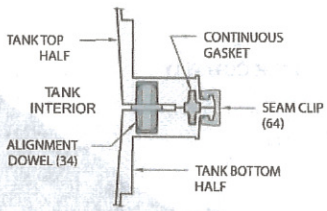
END VIEW

The IM-1060 is an injection molded two piece mid-seam plastic septic tank. The IM-1060 injection molded plastic design allows for a mid-seam joint that has precise dimensions for accepting an engineered EPDM gasket. Infiltrator's gasket design utilizes technology from the sanitary sewer pipe industry to deliver proven means of maintaining a watertight seal. The two-piece design is permanently fastened using a series of non-corrosive plastic alignment dowels and locking seam clips. The IM-1060 will be assembled and sold through a network of certified Infiltrator distributors.



SIDE VIEW

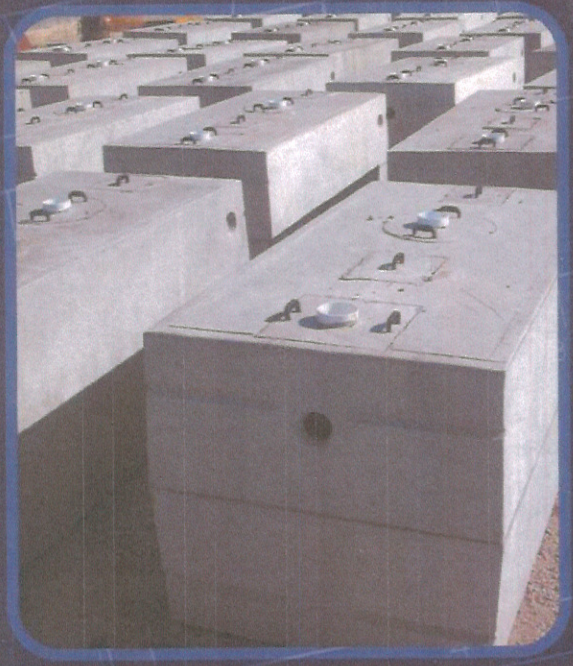
Parameter	Units	Value
Working capacity	gal (L)	1,070 (4,050)
Total capacity	gal (L)	1,247 (4,720)
Airspace	%	16.5
Nominal wall thickness	in (mm)	0.2 (5.1)
Length	in (mm)	127.0 (3,226)
Width	in (mm)	62.2 (1,580)
Length-to-width ratio	---	2.3 to 1
Height	in (mm)	54.7 (1,389)
Liquid level	in (mm)	44.0 (1,118)
Invert drop	in (mm)	3 (76)
Fiberglass supports	---	2
Alignment dowels	---	34
Locking clips	---	64
Compartments	---	1 or 2
Maximum burial depth	ft (m)	4 (1.2)
Minimum burial depth	ft (m)	0.5 (0.2)
Maximum pipe diameter	in (mm)	6 (150)
Weight	lbs (kg)	320 (145)



MID-HEIGHT SEAM SECTION

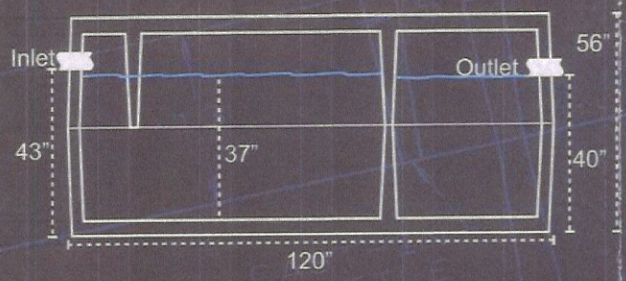
INFILTRATOR®
systems inc.
6 Business Park Road • P.O. Box 768
Old Saybrook, CT 06475
860-577-7000 • FAX 860-577-7001
www.infiltratorsystems.com

For technical assistance, installation instructions or customer service, call Infiltrator Systems at 1-800-221-4436



Concrete vs. Plastic

- Precast concrete septic tanks have been the accepted standard for over 60 years worldwide.
- Concrete tanks do not require precise hand backfilling with pea rock while filling with water to equalize pressure.
- Concrete tanks do not deform out of shape and will not puncture from debris.
- Concrete tanks do not require strapping and anchors.
- Installation and backfilling costs are less for concrete tanks than plastic tanks.
- Concrete tanks will not "float out" or "pop up" from high ground water tables.



Contractor Specs

Dimensions

- **Width: 60 inches**
- **Length: 120 inches**
- **Height: 56 inches**
- **Inlet Height: 43 inches**
- **Outlet Height: 40 inches**
- **Water Level: 37 inches**
- **Capacity: 1000 gallons**
- **Top Half Weight: 5400 lbs**
- **Bottom Half Weight: 4800 lbs**
- **Total Weight: 10200 lbs** (approx.)

Premium

Polylok II High Pressure Seal on Inlet
Polylok I Baffle & Filter Ready Seal on Outlet
Ready for 2", 3", or 4" lines

Easy grip Plastic Handles on accesses instead of rebar.

Custom Designs Available

Call for Pricing and Delivery Options

Wind River Ready Mix

End of S. 3rd St. West • PO Box 426
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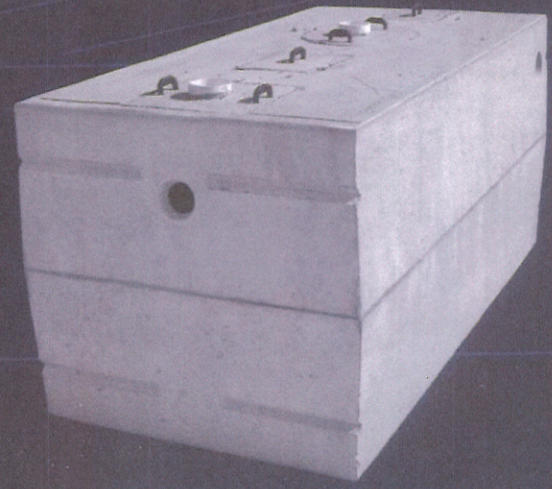
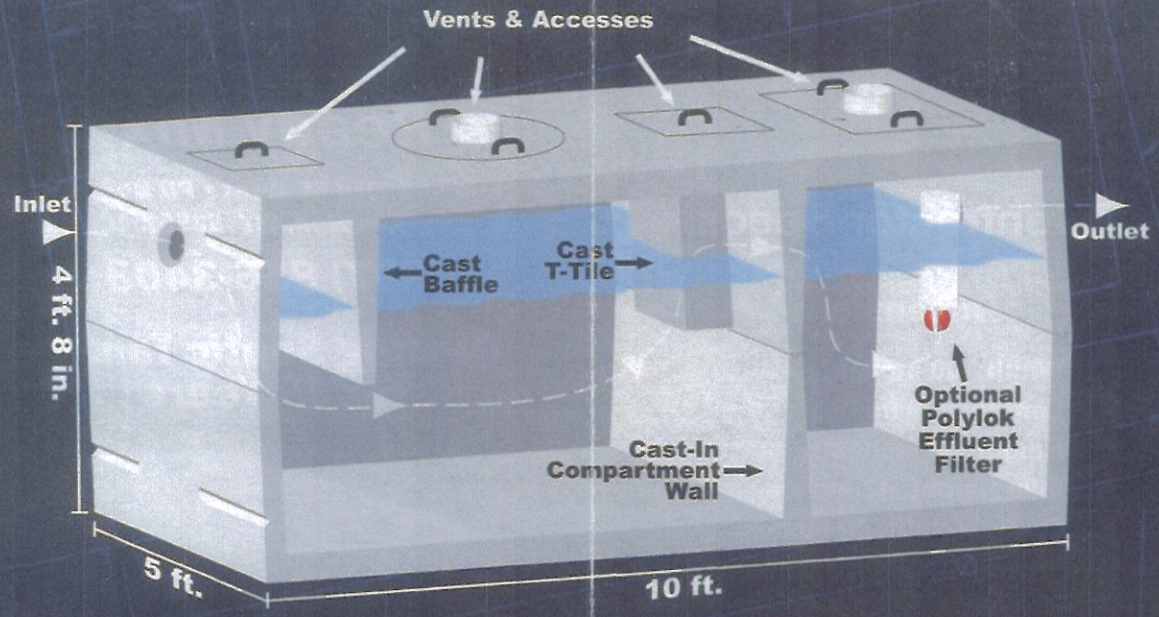
(307) 856-3403

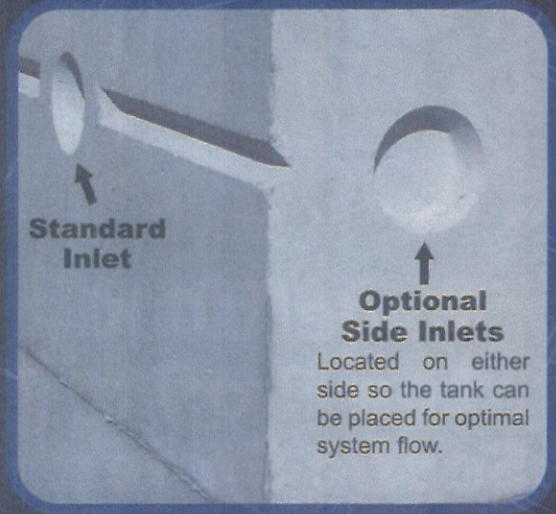
Casting Septic Tanks for 30 Years



Model 1000 Low Profile Septic System

Wind River's Model 1000 Low Profile Septic System





Located on either side so the tank can be placed for optimal system flow.

- ★ **The 1000 gallon septic system features a two baffle, two compartment design with two 6 inch cleanouts and optional washable effluent filter that is accessable from the surface.**
- ★ **There is a 4 inch soft plug inlet and an *efluent filter ready* 4 inch outlet made by Polylok.**
- ★ **Manufactured with 5000 psi concrete that is also reinforced with fiber and steel.**

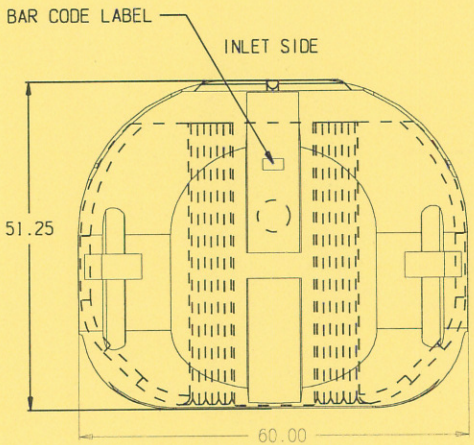
We use stronger concrete than most manufacturers (5000 pounds per square inch) which far exceeds minimum requirements. Also, we reinforce this concrete with fiber and steel to provide the highest possible structural integrity. You don't have to worry about our tanks collapsing under normal load.

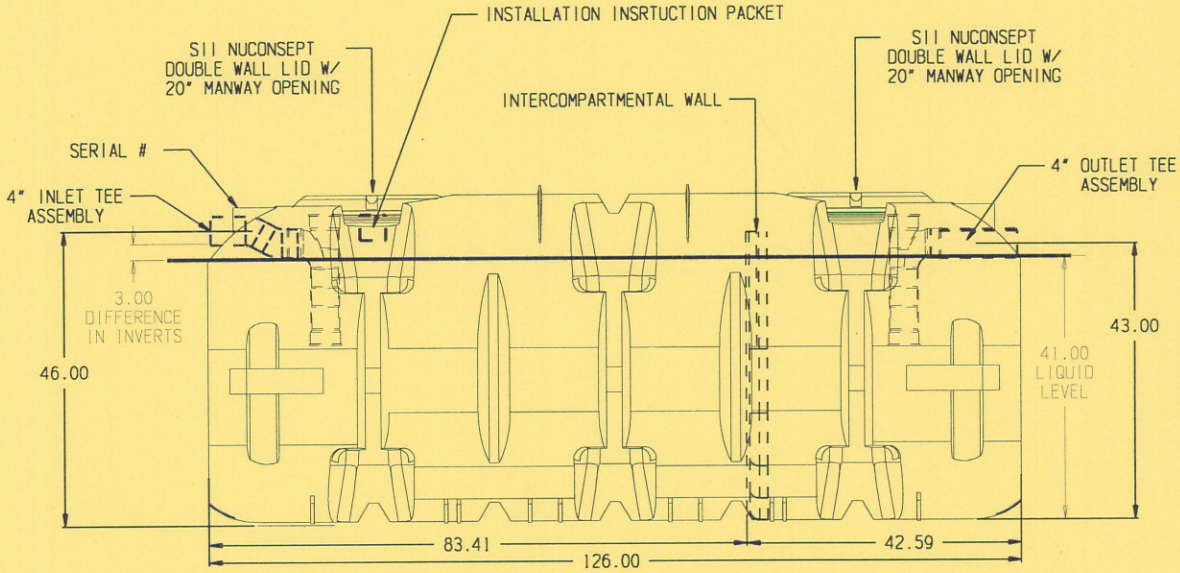
Every septic tank has two internal baffles that keep solid waste from reaching the field line and causing system failure. While other manufacturers use a failure prone baffle that slides into a groove in the tank wall, our baffles are poured as part of the wall structure and do not fail.

Manufactured to precise dimensions, meaning all pipe connections line up properly and seals work as designed to eliminate leakage.

1000 gallon tanks are ideal because pumping trucks are usually 1000 gallons and can pump your system in one trip.

Call about pricing and delivery options.





6" SEPTIC/CISTERN RISER BLACK [P/N 34300028] - OPTIONAL - NOT SHOWN
12" SEPTIC/CISTERN RISER BLACK [P/N 34300029] - OPTIONAL - NOT SHOWN
18" SEPTIC/CISTERN RISER BLACK [P/N 34300030] - OPTIONAL - NOT SHOWN

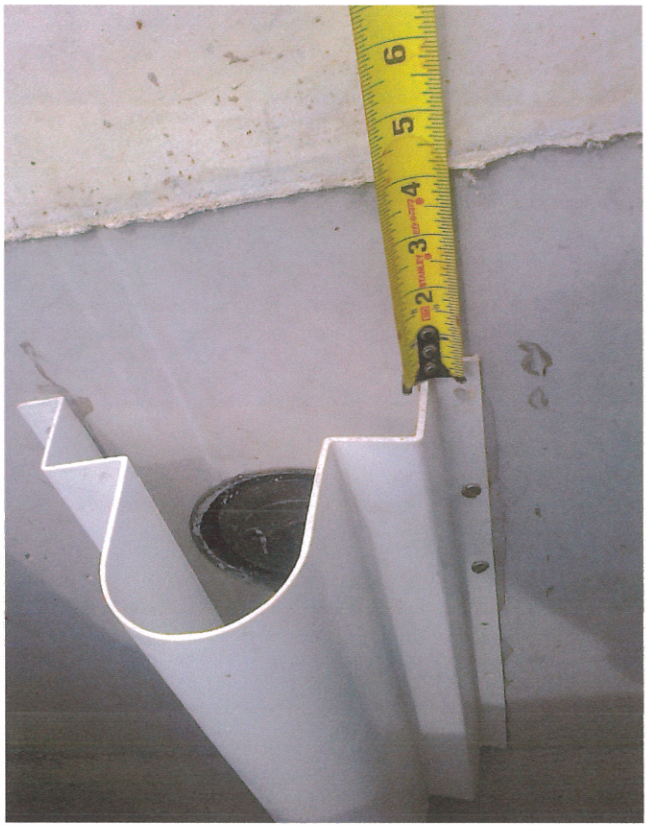
(all dimensions in inches)

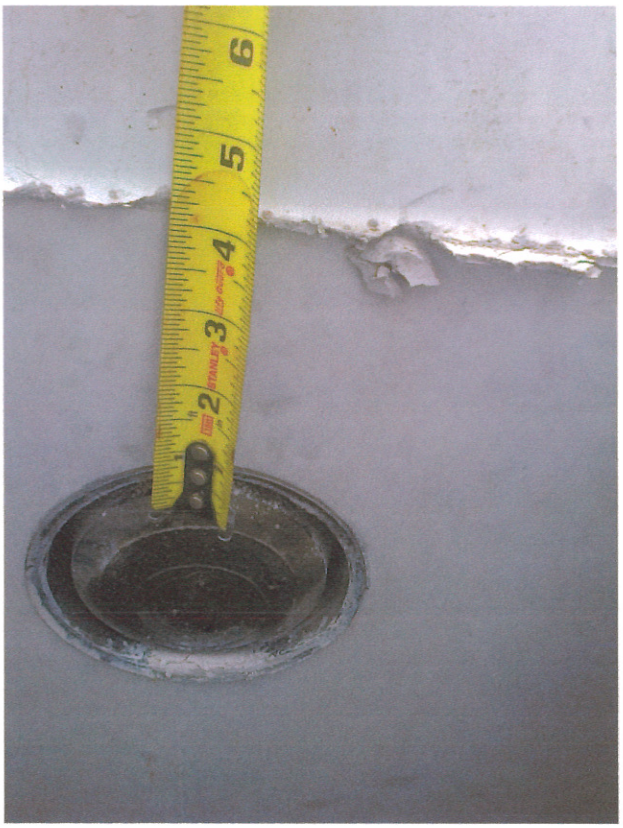
1000 DOMINATOR SEPTIC DOUBLE COMPARTMENT - W/ PLUMBING INSTALLED

PART # TANK: 1001010W95314
HDPE/WGRY

REF#: 0000 06/09/10

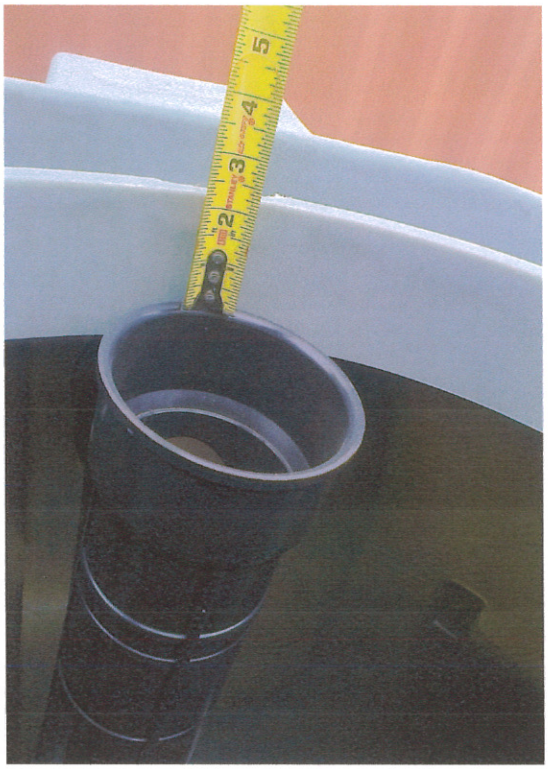
SNYDER INDUSTRIES INC.





Wind River Model 1000 septic tank inlet & outlet with baffle

Wind River Model 1000 Tank with caste inlet baffle and cutout for gas venting.



Snyder Dominator pre-plumbed septic tank inlet and outlet

SMALL FLOWS QUARTERLY

SF

Helping America's Small Communities Meet Their Wastewater Needs
Winter 2005 Volume 6 Number 1

JURIED ARTICLE

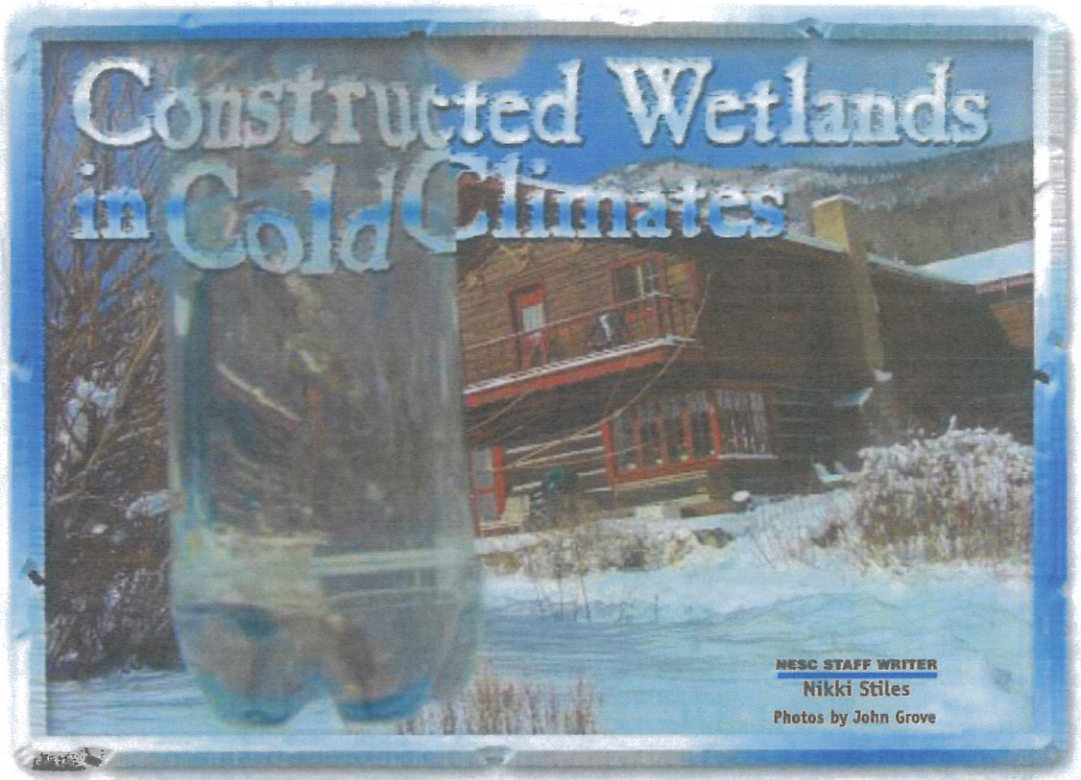
A Survey and Analysis of the Costs of Individual Onsite Septic Tank and Lagoon Treatment Systems

Constructed Wetlands in Cold Climates

Published by the National Environmental Services Center

Constructed Wetlands in Cold Climates

NESC STAFF WRITER
Nikki Stiles
Photos by John Grove

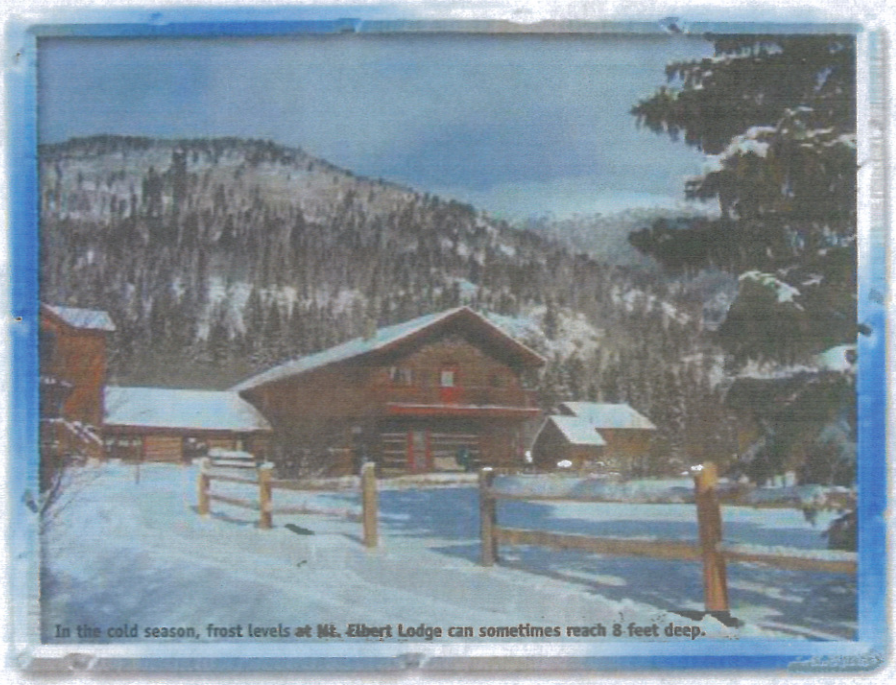


This bottle of clear effluent is a good indication the performance of this wetland located at Mt. Elbert Lodge near Twin Lakes, Colorado.

When you think about constructed wetlands as a source of wastewater treatment, you often don't think of Colorado. With an average altitude of about 6,800 feet above sea level, Colorado is the highest state in the union. Roughly three-quarters of the nation's land above 10,000 feet in altitude lies within its borders. The state has 59 mountains 14,000 feet or higher and about 830 mountains between 11,000 and 14,000 feet in elevation. With this wide range in topography also comes a wide range of climate with large, significant seasonal swings in temperature and day to night changes. In fact, in the wintertime in some places in Colorado, the temperature can drop below -30 degrees Fahrenheit. Despite these chilling temperatures, constructed wetlands thrive in many parts of the state, proving that they are not just for the mild climates.

The highest peak in Colorado is Mount Elbert, with an elevation of 14,433 feet. Just south of this peak lies Mt. Elbert Lodge in the Lake Creek Valley near Twin Lakes, Colorado. When Scott Boyd and Laura Downing purchased this lodge more than 10 years ago, they not only inherited the quaint cabins and breathtaking scenery, they also inherited a failing septic system.

"The county health officer was concerned with our proximity to surface water, since we have a nice-size stream that flows right by our proper-



In the cold season, frost levels at Mt. Elbert Lodge can sometimes reach 8 feet deep.

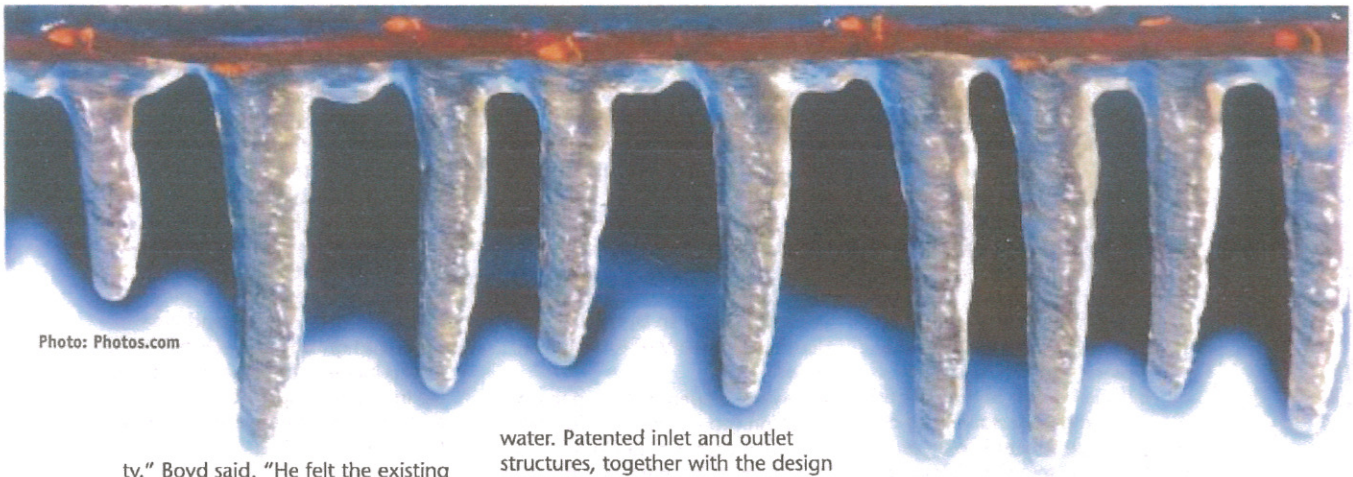


Photo: Photos.com

ty," Boyd said. "He felt the existing septic tank and leachfield were failing." After exploring their options, which included installing a small package wastewater treatment plant or a large holding tank that would have to be pumped every week, the new owners decided a constructed wetland was the best choice. "We felt it was a less-intrusive approach to treating wastewater, and it kept with the type of facility we have here," Boyd said.

Mechanics of a Constructed Wetland System

John Grove, owner of JUST Environmental Services in Buena Vista, Colorado, has installed more than 35 wetland systems for both commercial and residential use throughout the state of Colorado, including the one at Mt. Elbert.

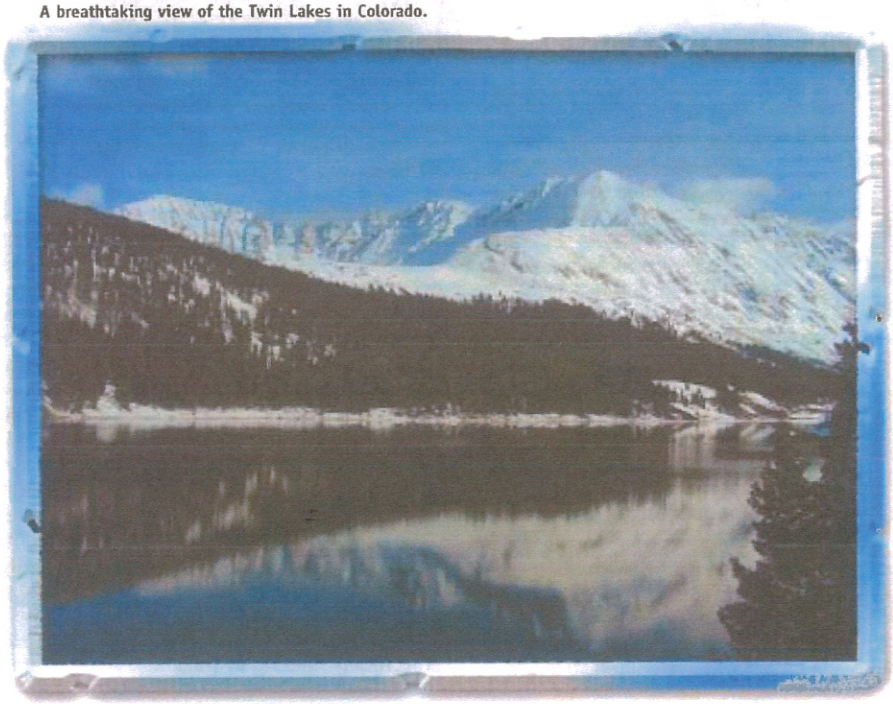
Grove calls his subsurface-flow constructed wetlands "Vegetated Bio-Reactors." These vegetated bio-reactors are preceded by a septic tank or settling basin that provides the primary or first stage of treatment and separates the grease and heavy suspended solids. Septic tank effluent then flows to the vegetated bio-reactor, which is a shallow basin or bed (about 3 feet deep) of coarse (3/4") gravel, with a layer of pea gravel overlying the basin. The top of the gravel is usually at the same elevation as the surrounding terrain, while a shallow berm and impervious liner isolates the water within the system from contact with the surrounding surface run-off and groundwater. Patented inlet and outlet structures, together with the design of the basin, ensure uniform horizontal and vertical flow patterns through the gravel bed, thus harnessing the full potential of the entire filter. The outlet structure can be adjusted to set the water level wherever needed for optimum system operation.

The water level is normally maintained 2 to 4 inches below the top of the gravel. Since the top of the gravel is dry, no odor escapes, insects cannot breed, and there is little danger of accidental human contact with the water in the treatment process. Selected local vegetation that thrives in wet conditions is planted in the gravel. The plants assist water treatment by using waste components in building the plant tissues, and the deep roots of aquatic vegetation create unique microzone environments and afford massive additional surface area for microbial attachment. After spending about a week in the wetland environment, the effluent flows into a traditional leachfield or reduced-size dispersal field for reintroduction to the groundwater.

The Antifreeze Design

"Initially, people said that the wetland would freeze solid in the winter being that we are at 9,700 feet," Boyd said. "But that certainly hasn't been the case; the top two or three inches of liquid may freeze but the other 36 inches of water underneath stays liquid. The bacteria continue to work on the wastewater." At the Mt. Elbert Lodge, the frost level in winter can reach more than

A breathtaking view of the Twin Lakes in Colorado.



8 feet deep. To help prevent freezing, Grove says, "We design the systems to accommodate a freezing layer. We design the system for wintertime reaction rates and retention times. We have a patented level-control structure inside the pond basin that really helps in the winter.

"Most traditional wetland designs have a pipe that goes out the bottom of the wetland cell and goes to some kind of wire-type structure to adjust levels. We found in Colorado that pipes full of water exiting the berm into freezing soil would freeze. What we've done is to move the spillway of the level-control structure inside the berm. That way, the pipe structure controlling the effluent level is actually surrounded by water, so the only part that can freeze is the surface inside that level control structure. You can put a little pump in there as an insurance policy, but we have found that with regular use, the water itself keeps the hydraulic flow path going through. We don't have any systems using mechanical heaters in the level control structures in Colorado," Grove said.

Cold-Weather Performance

A repeated contention by critics of constructed wetlands is that effluent quality performance suffers in the winter. However, data collected from a wetland in Fraser, Colorado, proves otherwise.

This constructed wetland in Fraser, also installed by Grove, serves 24 people in eight cabins, 12 months a year. The cabins themselves have no water or sewer connections; instead guests use a centralized shower and toilet house served by the wetland system.

Winter in Fraser is particularly harsh, with several low temperatures each season below -40 degrees Fahrenheit and several daytime highs below zero degrees Fahrenheit. To add insult to injury, this wetland is on the north slope of a forested hill, receives no direct sunlight in the winter, and no more than four hours of sunlight in the summer.

Samples taken from this site were analyzed by a lab technician in a municipal treatment plant in the region during a 13-month span from December 1998 to December 1999. Here is a summary of the data collected:

- Average effluent values, parts per million (ppm), were: biological oxygen demand (BOD) 34.9, ammonium 0.30, nitrates 1.67, fecal coliforms 48.2/100 mL.
- Average BOD removal was 82 percent, and average nitrogen removal was 92 percent.
- Effluent performance in January (coldest month) was BOD 37, ammonium 0.04, nitrates 1.3, fecal coliforms 37/100mL.
- Effluent performance in June was BOD 19, ammonium 0.17, nitrates 2.6, fecal coliforms 70/100 mL.

In the spring, the wetlands at Mt. Elbert Lodge blossom with Colorado columbine (the state flower), purple monk's hood, and native sedges and rushes.

Overcoming Misconceptions

A general misconception about constructed wetlands is that they require a large footprint. "Typically, I tell clients if you can park a car there, I can put a wetland there, because that usually solves a lot of issues as to whether I can get a backhoe to the site or not," Grove said. "It usually takes around 600 square feet to accommodate the actual wetland, and if the site conditions are conducive, we can fit the effluent disposal component right underneath the wetland, often making the total footprint smaller than conventional leachfields. Putting the disposal field under the wetland also helps prevent any freezing as well."

Another misconception is that constructed wetlands require a lot of maintenance. Boyd said that in the past 10 years, there has been virtually no maintenance needed on the wetland at Mt. Elbert. "This past spring, weather here was very unusual. Some of the plants on the inlet side died back, so we purchased some more wetland-type reeds and grasses and planted those just to increase the amount of plant life in the wetland," Boyd said. "But that's the first time we've had to do that in 10 years."

Overcoming Regulations

Although skeptical at first, the local county health departments gave Grove the "thumbs up" to install wetland systems. "We were a little leery at first, just being up in the mountains where we are near Aspen, the ski area. I wasn't sure it would work in our colder climate where we have a shorter warm period," said Nancy MacKenzie, Pitkin County Environmental Health Department's senior environmental specialist.

Almost 10 years ago, Grove took MacKenzie on a tour of several wetlands that he installed in the Denver front-range area. "We saw that they had been working well, and we allowed eight to ten to go in on an experimental basis. We've had no problems with them," she said.

"In some larger, more affluent areas like Pitkin County, it took me also 18 months to get the first permit for a wetland because they were so rigorous," Grove said. "Now it only takes me two weeks, like any standard permit application. It was just a matter of building that rapport—trust comes through experience." Wetlands are no longer considered experimental in Colorado. They are included in a list of engineered alternatives and have their own designation both in guidelines for municipal systems and in the state-wide individual sewage disposal guidelines.

Although great strides have been made in Colorado concerning the validity of constructed wetlands, some places in the rest of the world still need to be convinced. "We recently had a small town of about 300 people in Wyoming select this type of alternative," Grove said. "Then, when they approached the state for funds to make the project

happen, the engineers involved with the State Revolving Loan Fund said this wasn't a proven technology in Wyoming. Even though it's proven in Canada, Norway, and Colorado, just because there wasn't something they could point to in Wyoming, they decided they would rather see something else built. We often see the same failure funded again."

Visitors at Mt. Elbert Lodge sometimes have a picnic lunch beside the wetland and don't even know it.

Rewards of Having a Constructed Wetland

"Wetlands are not only a natural way to clean wastewater—they are energy efficient, help clean the air, provide wildlife habitat, constitute highly valued open space, and are aesthetically preferable to conventional wastewater treatment methods. The use of wetlands to treat wastewater is a win/win strategy for the environment and the public," writes Rick Grice, director of the Governor's Office of Energy Management and Conservation (OEMC) in the *Colorado Constructed Treatment Wetlands Inventory.*

This report details the activities of the OEMC Wetlands Task Force who, in 1999, set out to evaluate and document constructed wetland features and performance in Colorado, ending up with positive results. One of the benefits of wetlands that the task force found was minimal energy consumption, since typically constructed wetlands have no supplemental energy requirements. Other benefits of wetlands include minimal chemicals use, habitat for wildlife, educational value, and additional aesthetic value.

Another benefit Grove has found is better effluent quality. "When we collect effluent samples of some of my clients, their septic tank effluent is vastly better in quality than typical septic tank effluent samples that we see in literature," Grove said. "I kind of attribute that to the fact that [the owners have] this visible biomonitoring connection between them and the subsurface environment. Because they can see this wetland, I think they are more aware of what they put down the drain. If people are more emotionally attached to this little picnic area, they are less likely to dump that pesticide down the drain."

One of the benefits Boyd has found is the unique ability of the constructed wetland to fit into the natural environment at Mt. Elbert Lodge. "It provides a wonderful habitat for birds and rabbits because there are a lot of plants," Boyd said. "Ninety-nine percent of our guests don't realize that it is there. It sits right between our main lodge and three of our cabins and they don't realize that we are treating wastewater. We have never had an odor complaint from a guest in 10 years."

Echoing this, MacKenzie said, "I was worried that there would be an odor but there's actually nothing on the surface—all the liquid is below the surface. You don't even know you're walking on top of it. It blends right in with the environment."

Cost

The cost of a constructed wetland can not be compared to that of the cost of a traditional soil-absorption septic system because constructed wetlands require licensed engineer certifications. However, wetland installations can be comparable to other designs that require a professional engineer. For example, a constructed wetland installed at Cottonwood Hot Springs Inn and Spa near Buena Vista, Colorado, has a design flow of 2,000 to 3,000 gallons per day and serves approximately 50 people a day. The total cost of this project, including design, permitting, and construction was slightly more than $60,000. However, ongoing operation and maintenance costs for this constructed wetland are estimated to be as low as $2 per month per person. These costs include septic tank pumping, amortization of pump replacement every 10 years, and allows for nominal electric consumption. Given adequate pretreatment, Grove estimates the life of a constructed wetland to be 75 to 100 years or longer.

Future

One of Grove's future endeavors includes bringing constructed wetlands to Hungary. "Our plans include taking this technology to Hungary, because over there, they don't allow subsurface disposal, so there are no real practical small-scale treatment alternatives other than package treatment plants—and wetland are vastly more economical in the long run." Grove said. He has already received two U.S. Government sponsored grants to assist with technology transfer, and is currently waiting on funding authorizations to begin permitting efforts on two commercial projects there.

Another hope of Grove's is to push for the state of Colorado to aggressively fund constructed wetlands. "I want to get more active politically. We have old laws in many States that literally make central sewers mandatory. We need to get the individual State Revolving Fund Programs to recognize this alternative specifically so that an applicant who comes to them for funding won't have to go through the process of educating them in order to get the concept approved." he said.

"I encourage people to look at this alternative in concert with decentralized management scenarios, particularly in the light of xenobiotics and other emerging pollutants. With the increased detention and dilution involved, it's important that we not just rule out wetlands because somebody thinks they will freeze, smell, or that they are too large—because those kind of quick knee-jerk reactions happen a lot," Grove said. "It's usually some poorly informed bureaucrat in the driver's seat who likes to present personal opinions as fact without ever even reading a single word on the subject. Unfortunately, such closed minds often end up just flushing good money down the toilet, literally."

For more information contact Grove at (719) 395-3275 or **info@justwetlands.com**, or visit **www.justwetlands.com**, or for a copy of OEMC report go to **www.state.co.us/oemc**.