Barry-Eaton District Health Department

All About Mounds

How Sewage Systems Work

A typical on-site sewage (septic) system consists of a **septic tank**, which separates solids and grease from liquids and breaks down organic matter, and a **soil-absorption system**, which takes the liquid sewage (**effluent**) released from the septic tank and slowly releases it into the soil.

When a system works properly, natural bacteria in the soil break down the potentially harmful disease-causing organisms in sewage. In order for these native bacteria in the soil to work, they need oxygen. For there to be enough oxygen, the natural soil must have enough porosity (empty space) to hold oxygen.

There are many types of sewage systems. The main factors in determining what kind of system is appropriate for a given site are the **seasonal water table level** (the depth at which the soil is completely filled with groundwater, with no room for oxygen, during the wet seasons) and the **soil type**. When the seasonal water table level is high, the soil is filled with water (and no oxygen) and cannot effectively treat sewage. Because different types of soil hold water differently and some hold onto it for much longer than other types, soil type can also affect how much oxygen is present and thus how well sewage is treated.

Clean Water starts at Home

When a sewage system is placed too close to or within the water table or saturated soils, three things can happen: (1) the sewage system could fail prematurely due to a lack of oxygen in the soil; (2) sewage might not be effectively treated before it enters the groundwater; and (3) sewage could back up into homes or on the ground, especially during wet weather seasons.

Because sewage system type is dependent on these site conditions, not all types of sewage systems are able to be installed at every site. We have to work with the natural canvas of soil type and water table level that Mother Nature gave us.

The Barry-Eaton District Canvas

There are many types of soil across the Barry-Eaton District and even within the same site. One soil type is dry, and sandy—this drains water well and allows oxygen to be present. This soil is usually suitable for conventional (in-ground, gravity drained) systems. Conventional sewage systems are the most common systems permitted by the Barry-Eaton District Health Department (BEDHD).

In some areas of our district, the water table is high. When a site has a high water table and slow-draining soils, low-pressure dose mound systems (called "mounds" in this document) are often the only system that BEDHD can design. Another, often more costly, option is an alternative wastewater system designed by an engineer.

Source: https://www.pca.state.mn.us/

Low Pressure Dose Mounds: The Misunderstood Workhorse

Without the ability to treat sewage through low-pressure dose mounds, many more sites in the district would require engineer-designed alternative systems—if the site could be approved for sewage systems at all! Mounds are the less expensive, more effective compromise between no system and an alternative system that allows our community to continue to develop properties that would otherwise have to remain vacant. Mounds are proven, time-tested, and effective.

Barry-Eaton Sanitary Code Changes

In 1994, the Barry-Eaton Sanitary Code was modified with the approval of the Board of Health and each county board of commissioners. The major change was to add *alternative on-site wastewater treatment systems* ("engineered systems")—including raised mounds—designed by a qualified wastewater consultant or engineer as an approved system type. This code change offered solutions for many sites with the difficult soil and/or high water table conditions common in the district. This code change allowed sites that before did not meet Sanitary Code requirements to now be permitted.

By 2000, the Sanitary Code was again modified at the request of the Board of Health. This change removed the requirement that a consultant or engineer prepare plans for raised mounds. This removed the cost of having to pay for a consultant or engineer. Instead, BEDHD staff trained in mound siting and design were now able prepare the construction plans for mounds.

Today, BEDHD staff often issue *non-conforming site addendums*—a type of variance—to allow the installation of low-pressure dose mounds on sites that would otherwise require an engineer's plans. Residents who disagree with a sanitarian's design can seek a second option of a senior sanitarian or supervisor. The code also allows the right of appeal to the Board of Health.

What Are Some Common Features of Mounds?

Pressure distribution. Conventional in-ground sewage systems fail slowly over time. This is a natural feature of systems with this type of older technology. In contrast, mound systems do not have this progressive failure because the sewage is distributed equally over the entire system.

A special type of sand. Not just any sand can be used beneath a mound sewage system. A special type of sand must be used to prevent soil clogging. This sand is common and commercially available within our district.

A special time of the year. Construction of some mounds is limited to certain dry periods of the year. This is true because mounds that are built on the heaviest soils can be easily compressed or "smeared" during wet periods of the year. If a mound is built in wet weather, the saturated soil beneath the mound can lose its ability to transmit water, thus destroying its ability to be used for sewage treatment and leading to premature failure.

What Misconceptions About Mounds Exist in Our Community?

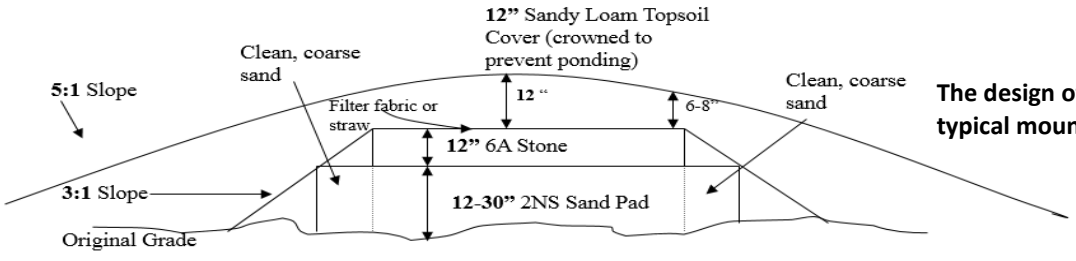
BEDHD only permits mounds. FALSE! Mounds are only a small portion of the sewage permits that BEDHD issues. However, mounds are more noticeable because they are above the ground, while other permitted systems blend in with the yard. While a given site might not support a conventional system and BEDHD may recommend a mound, there is always the option to work with a private consultant to engineer an alternative system.

Mounds always cost $20, $30, or $40 thousand. FALSE! While mounds are more expensive than conventional sewage systems, their cost is typically five to ten thousand dollars more. The more challenging a site is in terms of available space and access for delivery of material, the higher the cost. Also, while a comparison is most commonly drawn between mounds and conventional sewage systems, it is important to remember that the sites where a mound is permitted are those that simply cannot be approved for conventional sewage systems. A more apt comparison is between a mound and an engineer-designed alternative system, and the latter will almost always be more expensive.

Mounds freeze often. FALSE! One of the most common myths is that mounds freeze every winter. BEDHD has permitted these mounds for more than twenty years and has very rarely been contacted about a mound freezing. In those rare cases, the freezing was due to installation error, and BEDHD worked with the installer to fix the problem. BEDHD also meets regularly with sewage system installers to educate them on proper installation techniques.

You don't need a mound if you cut out the clay. FALSE! Another common misconception is that the heavy soils beneath the drainbed area can simply be removed and, after filling the empty space with sand, a gravity system can be installed. This type of system design (called a **deepcut system**) can only be used when there is dry, sandy soil beneath the removed heavy soil. Without this, water from the sewage system has nowhere to go, so it collects within the excavation. This is known as the "bathtub effect" because water fills the hole just like it would a plugged bathtub. This does not happen beneath a mound because of the equal distribution of sewage and the increased surface area of the mound.

Pumps within sewage systems commonly fail and lead to backups and expensive repairs. FALSE! A pump may be necessary within a sewage system for a couple of reasons. First it may be necessary to simply overcome gravity, i.e. the sewage system is higher in elevation than the pump. What is often misunderstood however is the increased effectiveness of sewage systems provided with equal distribution of effluent via a pump. The pump serves to pressurize the distribution network allowing the mound to work much more efficiently and further reduces the likelihood of any portion becoming overloaded which promotes the longevity of the system. A properly maintained pump should not fail often. It should also be noted that pumps are common in today's modern society and virtually no one can avoid the use of a many pumps on a daily basis. From our vehicles to our washing machines, dish washers, wells, and even our septic tanks, pumps serve a useful and necessary place in our lives and there is no reason to fear one.



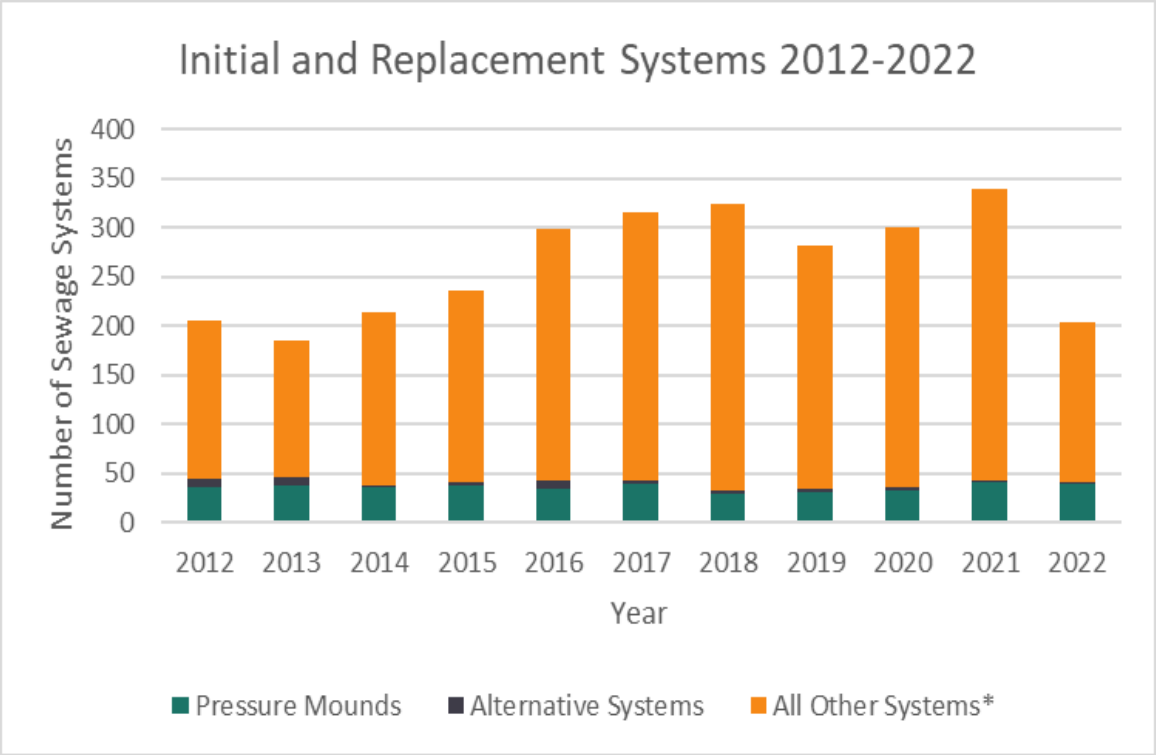
The design of a typical mound.

Initial and Replacement Sewage Systems Permitted by BEDHD FY 2006-2022

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022**
Pressure Mounds	36	38	36	37	34	39	29	31	33	41	39
Alternative Systems	8	7	2	3	8	3	3	3	3	2	1
All Other Systems*	161	140	175	196	256	274	292	248	265	297	164
Total	205	185	213	236	298	316	324	282	301	340	204

* All other systems includes drainbeds, drainfields, gravity mounds, drywells, and modified block trenches

** Through August 31, 2022



For more information on mound sewage systems, please see:
https://www.epa.gov/sites/production/files/2015-06/documents/mound.pdf

Jay VanStee
Environmental Health Director
jvanstee@bedhd.org
(517)541-2618

Jodi Pessell
Environmental Health Supervisor
jpessell@bedhd.org
(517)541-2617

Barry-Eaton District Health Department