

Technology Choices for Developers and Subdividers in Non- Sewered Areas





Maine towns that lack funds to build centralized sewer systems have found it difficult to encourage traditional village-type growth. Current zoning regulations tend to promote low-density development in areas where higher densities are desired (such as village growth centers). The Maine State Planning Office (SPO) hired Stone Environmental to determine if decentralized wastewater infrastructure could support higher densities in Maine's villages without compromising the quality of the state's watersheds.

Stone studied the state's environmental laws and regulations, and the characteristics of its soils, groundwater, and bedrock. We analyzed decentralized wastewater technologies and the options for managing decentralized infrastructures. We then compared our findings with Maine's growth goals to determine whether the use of decentralized wastewater systems is desirable and feasible in the state. Finally, we summarized our findings in a set of handouts and technical papers to educate local decision makers and real estate developers.

- An eight-page brochure, *Partners in Building Maine's Future: What Subdividers and Planners Need to Know about Septic System Options in Local "Growth" Areas*. It provides a comprehensive look at the issues surrounding decentralized water and wastewater infrastructure.
- Four two-page handouts that provide an overview of decentralized infrastructure from four angles.
 - *Technology Choices for Developers and Subdividers in Non-Sewered Areas*
 - *Management of Decentralized Wastewater Systems in Maine*
 - *Creating Communities with Decentralized Wastewater Solutions*
 - *Partners in Building Maine's Future: Decentralized Wastewater and Smart Growth.*
- Four technical assistance bulletins (TABs) that describe in detail the scientific basis for our findings.
 - *Decentralized Wastewater and Water Supply Technologies and Performance (TAB #9)*
 - *Management, Policy Options and Guidance for Water Supply and Decentralized Waste Water (TAB #10)*
 - *How to Make Growth Areas Work Without Sewers: Three Approaches Plus None of the Above (TAB #11)*
 - *Decentralized Wastewater and Water Supply: Further Reading (TAB #12)*

We conducted our work for the Maine SPO between May and December 2003.

Stone Environmental was founded in 1992 and quickly established itself as one of the top US firms evaluating the environmental effects of agrochemical use. Since then, we have grown into a successful multidisciplinary team of more than 25 scientists and 40 employees, and added services in the areas of water resources and wastewater, site investigation, and information for sustainable development. Stone is based in Montpelier, Vermont, an area admired for its quality of life and strong environmental values.

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DECENTRALIZED WATER SUPPLY and waste water treatment and disposal technology choices can be used to meet development density goals in Maine's growth centers. Based on today's technology options, using large lots to protect public health and the environment is not necessarily sound science. An understanding of today's technology, coupled with good planning and a commitment to maintenance and management, is a vital step towards safely developing denser growth areas.

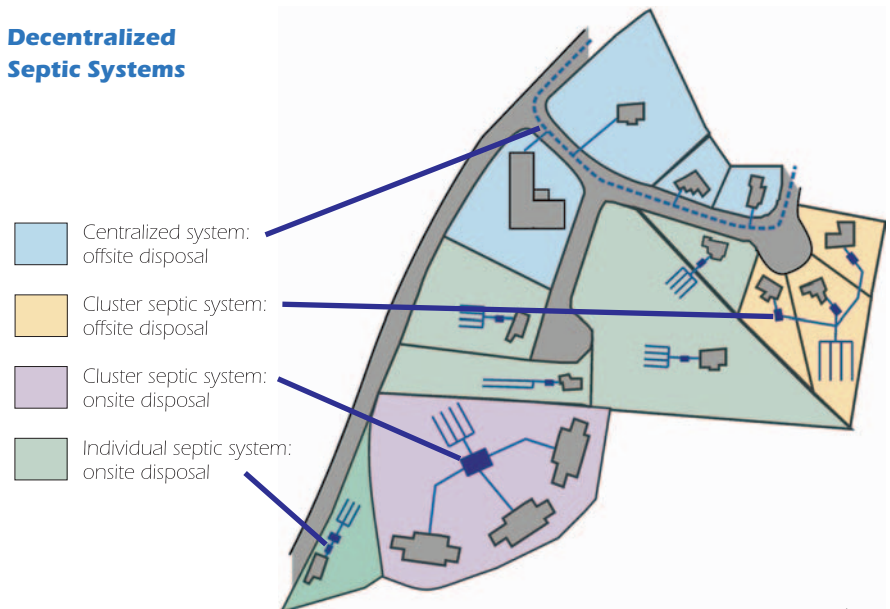
What Is a "Decentralized" System?

Decentralized systems include traditional septic systems that serve individual homes or businesses, advanced pre-treatment and disposal systems, and offsite cluster collection, treatment and disposal systems. Decentralized water systems can also include a mix of individual onsite drilled wells, and shared or community water supplies (particularly useful for compact developments).

Components of a Septic System

Conventional onsite septic systems typically include a 1,000 gallon septic tank, a distribution box (in some cases), and a disposal field or drainfield (see figure on reverse). The septic tank settles out solids and greases and provides primary treatment. The waste water effluent then either flows through a distribution box or directly into serially connected perforated pipes, where it is evenly dispersed throughout the subsurface disposal field. Most disposal areas are installed at or above

Decentralized Septic Systems



the existing ground, providing the necessary separation to seasonal groundwater or bedrock.

Pre-treatment systems can be added prior to the disposal field. Adding pre-treatment may reduce the area needed for a disposal field (typically by one-half). However no reductions in horizontal or vertical separation distances are gained.

Disposal fields typically include perforated PVC pipe placed in stone aggregate and covered with filter fabric and topsoil. Substitutes for stone include concrete or plastic chambers, other proprietary disposal devices, peat, fabric-wrapped pipe, and subsurface drip disposal. The location, size, and bottom elevation of disposal systems are determined by the soils and site conditions found on the property. The position in the landscape, slope, and setbacks from water-

bodies and wells are also considered when locating septic systems. First-time onsite systems are not allowed where the depth to seasonal high groundwater table, restrictive layer, or bedrock is less than 12 inches below ground outside of Shoreland Zoned areas and 15 inches within Shoreland Zoned areas. A first-time system variance procedure may allow new systems on sites with as little as seven inches to seasonal water table if sufficient points can be earned. Utilization of pre-treatment is one way to earn points.

Community (cluster) collection, treatment and disposal systems can be considered where onsite soil conditions are poor and a suitable area exists nearby, or where compact developments are envisioned. Cluster systems can be as simple as a conventional system shared between two lots, or as complex as

Planning Process for Developers and Planners

Step 1: Identify Drinking Water Sources

Identify nearby community water supply sources so septic systems can be designed to meet safe setbacks. Source water protection areas or groundwater recharge areas may require special consideration for onsite septic systems. Also, consider whether to identify individual drilled wells on separate lots, or whether municipal water is available; or whether to consider community wells.

Step 2: Identify Surface Water Sensitivities

Many developers want to help protect environmental resources, particularly on properties near water. Coastal waters may require additional pre-treatment of waste water to reduce nitrogen loads. Establishing buffers to water resources will help reduce overall development impacts related to stormwater and waste water.

Step 3: Identify Land Use Density Goals

Developments occurring in areas defined in local town plans as growth centers may include small lot sizes, multi-family units, and commercial and light industrial uses.

Step 4: Identify Potential Impacts of Traditional Systems

Based on the information gathered in Steps 1 through 3, an assessment on the potential impacts from onsite systems can be made.

Step 5: Choose Waste Water Treatment Performance Standards

An evaluation can be completed which determines the best water supply and waste water treatment options for the property. A consideration of the waste water treatment performance standards needed should be included, along with considering traditional septic systems, small and large cluster waste water systems, and the use of pre-treatment.

a large collection, treatment and disposal system comparable to a municipal sewer system. Systems larger than 2,000 gallons per day are considered “engineered systems,” and require approval from the Division of Health Engineering, which solicits review comments from the Department of Environmental Protection. As cluster systems increase in size, treatment performance standards also increase. Long-term operation and maintenance needs to be planned during the development process.

Septic System Performance

The conventional septic system can treat many of the constituents present in residential waste water. Treatment occurs in the septic tank and disposal field, particularly at the stone-soil interface. The separation to seasonal groundwater, restrictive layers, and bedrock provides the final treatment, including removal of many pathogens. A conventional septic system may not provide adequate treatment of nitrogen, particularly in areas where groundwater is used for drinking water sources. Pre-treatment systems can be added to overcome many of the impacts from nitrate, phosphorus, and pathogens. Other waste water constituents that can be of concern include toxic chemicals, which may not be adequately treated prior to disposal.

Decentralized Systems Protect Communities

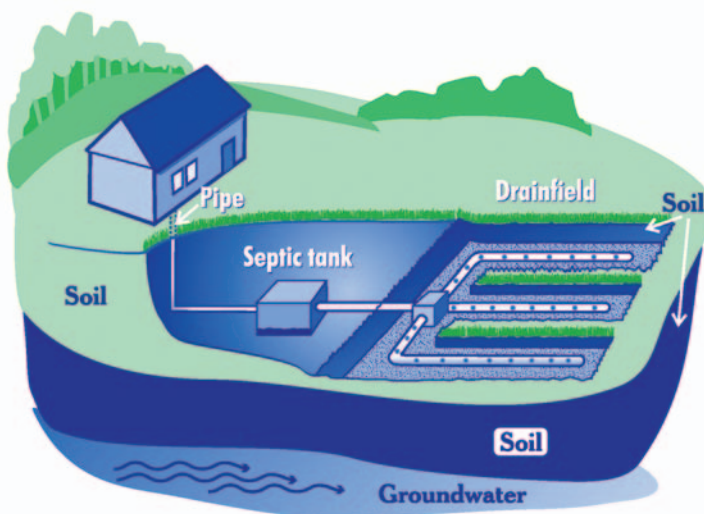
When septic systems are designed, installed, and maintained properly, they protect public health, drinking water supplies, and the quality of nearby lakes, ponds, rivers, and coastal areas. Successful management of these systems preserves property values and can be less expensive than a conventional centralized sewer in terms of both construction and maintenance costs. Decentralized systems combined with a good management program can help communities in Maine achieve their growth and development goals while preserving residents’ quality of life.

For More Information

Maine State Planning Office
(207) 287-3261
www.maine.gov/spo/

Maine Department of Environmental Protection
(207) 287-2111
www.maine.gov/dep/index.shtml

Maine Department of Human Services, Wastewater & Plumbing Control Program
(207) 287-5689
www.maine.gov/dhs/eng/plumb/index.html



A conceptual drawing of a conventional septic system that serves a single-family house. Source: U.S. Environmental Protection Agency.