

Program Update Report

New Jersey Pinelands Commission

Alternate Design Treatment Systems Pilot Program



December 2022

Background

The Federal and New Jersey Pinelands statutes call for the preservation, protection and enhancement of the unique Pinelands ecosystem and its land and water resources. The exceptional quality of Pinelands water resources is protected and maintained through the control of development and other land uses and through close cooperation and coordination between local, state, and federal agencies. To safeguard Pinelands water resources, the water quality provisions of the Pinelands Comprehensive Management Plan (CMP) focus on controlling the amount of nitrogen that enters the environment. Nitrogen is a significant point and nonpoint source pollutant due to its role in the eutrophication of surface water bodies. It is a useful indicator of overall Pinelands water quality and ecosystem health because it is naturally present in very low concentrations in the Pinelands environment. The Pinelands CMP has long recognized the importance of controlling nitrogen on both local and regional scales and provides for the establishment of land use policies and engineering solutions to protect the region's sensitive ecology.

The Commission's land use program discourages development in important ecological and agricultural areas while directing growth towards more suitable areas. While some of the designated growth areas are served by central sewer systems, others are not. In these unsewered growth areas, municipalities may zone for residential development on lots as small as one acre. One acre lots are also permitted in non-growth areas if certain cultural housing and grandfathered ownership conditions are met. In very limited instances, waivers of strict compliance allow for development of unsewered dwellings on lots as small as 20,000 square feet.

The water quality standards of the CMP permit the use of on-site septic systems (individual subsurface sewage disposal systems) provided that the design of the system and the size of the parcel on which the system is located will ensure that the concentration of nitrogen in the ground water exiting the parcel or entering a surface water body will meet the Commission's water quality standard of two parts per million (ppm). The CMP utilizes the Pinelands Septic Dilution Model to calculate nitrogen loading to groundwater from septic systems and to confirm that proposed loadings do not exceed the assimilative capacity of the environment. When standard values for home occupancy, wastewater volume, wastewater strength and rainfall infiltration are used in solving the model, the model calculates that a minimum 3.2-acre parcel is required to dilute nitrogen to the required 2 part per million (ppm) concentration when conventional septic system technology is used. Conventional septic system technology, typically consisting of a septic tank and effluent dispersal field (and sometimes a pump and dosing tank) is ineffective at removing or attenuating nitrogen levels in wastewater. Thus, unsewered residential development using standard (conventional) septic system technology is permitted only on minimum 3.2-acre parcels.

To comply with the Pinelands water quality standard, unsewered residential development on parcels smaller than 3.2 acres requires the use of advanced onsite denitrifying wastewater treatment technology. If the mass of nitrogen contained in the wastewater discharged from an on-site septic system is sufficiently reduced through the use of an advanced treatment system, the CMP allows the minimum lot size required to meet the 2-ppm property line concentration to be reduced from 3.2 acres down to a minimum of 1.0 acre.

The basic principles of biological nitrogen reduction in wastewater are well documented in the engineering literature. In fact, biological nitrification and denitrification is now routinely employed at large centralized sewage treatment plants, especially those that discharge treated effluent to environmentally sensitive receiving waters. These large-scale treatment facilities utilize professionally trained and licensed operators and can enhance nitrogen removal using chemical feed equipment and to make real-time process modifications in response to changing influent wastewater characteristics.

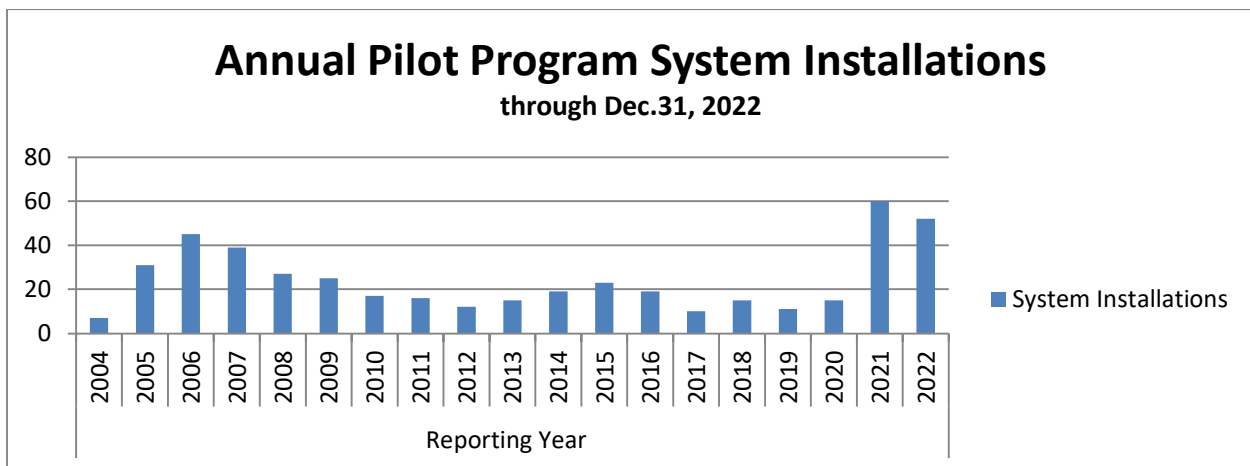
The use of biological denitrification technologies at the much smaller scale of individual onsite systems is becoming more common in ecologically sensitive regions. The U.S. Environmental Protection Agency (EPA) as well as number of individual states and regions have developed and are currently administering programs to study the effectiveness of onsite wastewater denitrification treatment technologies. The Pinelands Commission's Ad Hoc Committee on Alternative Septic Systems was convened in March 2000. Commission staff conducted a thorough review of ongoing work to evaluate alternate treatment technologies nationwide, consulted with officials from other state and university programs involved with advanced on-site septic system technologies and management strategies, retained a consultant to assess the technical performance of selected technologies, met with treatment system manufacturers and county health officials, and coordinated research efforts with the New Jersey Department of Environmental Protection (NJDEP). After completing this research, the Committee recommended the establishment of a pilot program to test five specific onsite wastewater treatment systems. The Alternative Design Wastewater Treatment Systems Pilot Program was adopted in 2002 and is codified in the CMP at N.J.A.C. 7:50-10.2. The Pilot Program authorizes installation of these systems and requires testing to determine whether they can be operated and maintained to meet the Commission's water quality standards with maintenance requirements that a homeowner can be reasonably be expected to follow.

Since 2002, the Commission has authorized the piloting of 12 nitrogen attenuating wastewater treatment technologies for residential use in three separate rounds of technology admittance. These technologies include:

Round 1 (2002)	Round 2 (2011)	Round 3 (2021)
Ashco A RFS	BioBarrier	Fuji Clean USA
Amphidrome	Busse GT	Pugo
Bioclere	Hoot ANR	Waterloo Biofilter
Cromaglass	SeptiTech	
Fast		

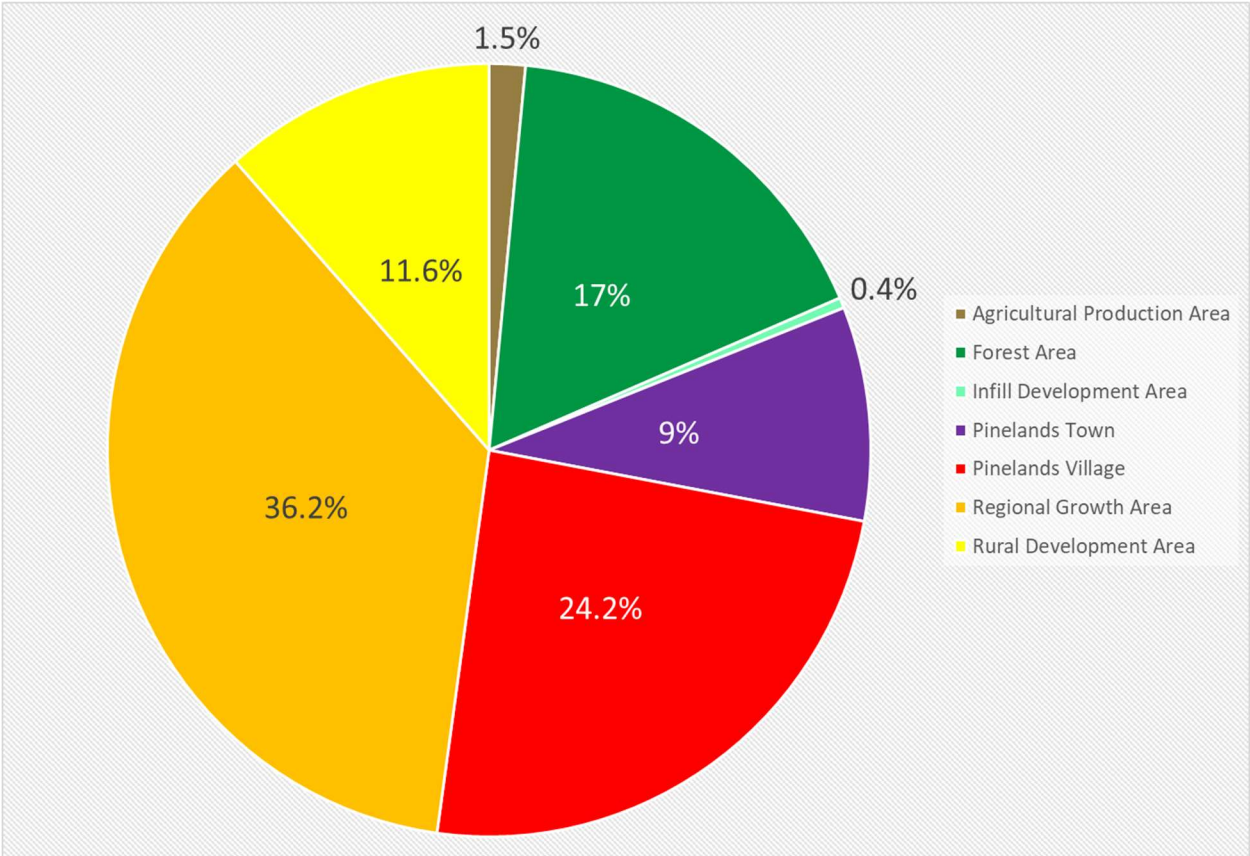
The pilot program requires the submission of laboratory analyses of treated effluent to demonstrate the technologies' ability to meet the water quality standards of the CMP. Through this monitoring program, the Commission has granted permanent (non-piloting) approval to the Amphidrome, Bioclere, and SeptiTech technologies for use on minimum 1-acre parcels and to the FAST technology for use on minimum 1.4-acre parcels. The Busse GT, Hoot ANR, Fuji Clean USA, Pugo, and Waterloo Biofilter are in the piloting phase while the Ashco A RFS, Cromaglass, and BioBarrier technologies have been removed from the pilot program due to their inability to demonstrate compliance with the Commission's water quality standards.

Since the inception of the pilot program, a total of 458 alternate design wastewater treatment systems have been installed to service new residential development in the Pinelands Area as shown in the system installation graphs below.



Pilot Program Installations by Pinelands Management Area

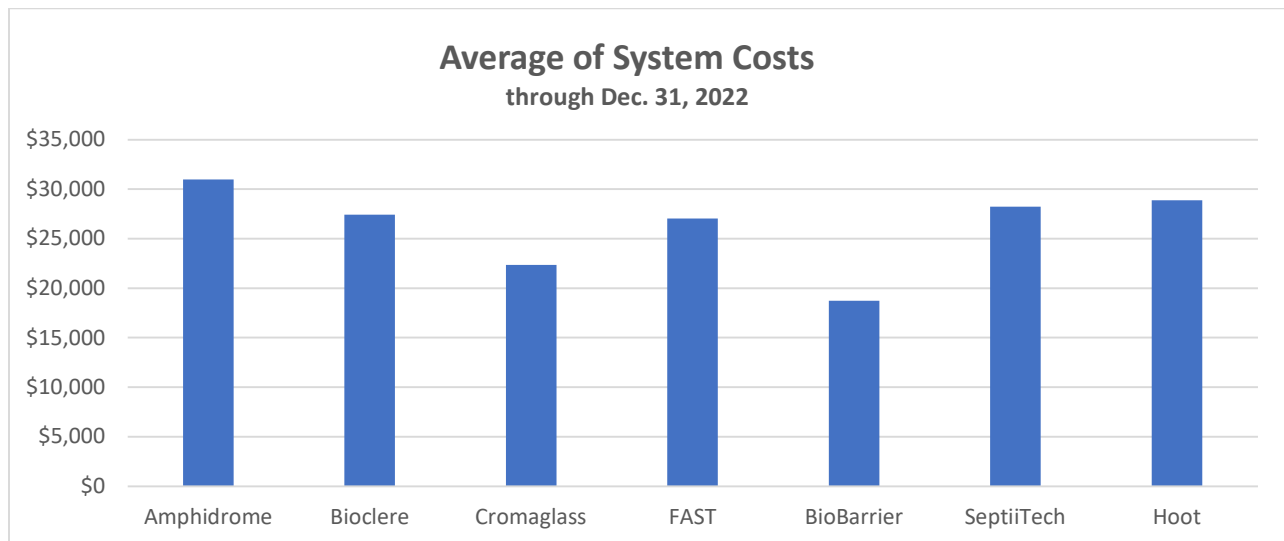
through Dec. 31, 2022



Technology Locations by County and Municipality

through Dec. 31, 2022

County	Municipality	Technology						Hoot	Total
		Amphidrome	Bioclere	Cromaglass	FAST	SeptiTech	BioBarrier		
Atlantic	Buena Vista					1			1
	Egg Harbor Twp	2	5		2				9
	Estell Manor		9						9
	Folsom	5	3	1	1				10
	Galloway	1	1		2				4
	Hamilton	15	22	4	3				44
	Hammonton	4	3		1				8
	Mullica	3	5		1	2			11
	Port Republic				1				1
Burlington	Evesham	1	1						2
	Medford	3	1		2	8			14
	Pemberton	12	12	23					47
	Shamong	2				1			3
	Tabernacle	3	5	1	1	83	1		94
	Washington	1	1						2
	Woodland	1	3		3	2			9
Camden	Chesilhurst		1						1
	Waterford	3							3
	Winslow	8	6	4	7	16			41
Cape May	Dennis	2							2
	Upper	2	2						4
	Woodbine		1		1				2
Gloucester	Franklin	1		1	3				5
	Monroe				2				2
Ocean	Jackson	23	2	16	9	12	12	3	77
	Lacey	2							2
	Manchester	24	2	9	2	7		1	45
	Stafford	5	1						6
Total Installations		123	86	59	41	132	13	4	458



In summary, the Pinelands Commission's Alternate Design Wastewater Treatment Systems Pilot Program has successfully identified advanced onsite wastewater treatment technologies that enable residential development to meet the Commission's rigorous water quality standards in areas where such development is otherwise authorized on lots that are smaller than 3.2 acres.

The pilot program has also been instrumental in identifying advanced wastewater treatment technologies that enable non-residential development to meet the Commission's water quality standards through the efficient use of land. This is particularly true in Pinelands Town and Village management areas where large tracts of land would otherwise be required to meet the Commission's water quality standards through dilution alone in a manner that is incompatible with desired development densities.