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Standard Practice for Surface Site Characterization for On-Site Septic Systems[1]

This standard is issued under the fixed designation D 5879; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

ε[1] NOTE—Paragraph 1.4 was added editorially October 1998.

1. Scope

1.1 This practice covers procedures for the characterization of surface conditions at a site for evaluating suitability for an on-site septic system for disposal and treatment of wastewater. This practice provides a method for identifying potentially suitable areas for soil absorption of septic tank wastewater.

1.2 This practice can be used at any site where on-site treatment of residential and nonhazardous commercial wastewaters using septic tanks and natural soils or constructed filter beds is required or an option under consideration. This practice may also be useful when constructed wetlands are used as an alternative wastewater treatment method.

1.3 This practice should be used in conjunction with Practices D 5921 and D 5925.

1.4 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 5921 Practice for Subsurface Characterization of Test Pits for On-Site Septic Systems[2]

D 5925 Practice for Preliminary Sizing and Delineation of Soil Absorption Field Areas for On-Site Septic System[2]

3. Terminology

3.1 *clinometer, n*—an instrument for measuring inclination, as in topographic slope.

3.2 *constructed filter bed, n*—a material, usually of a sandy texture, placed above or in an excavated portion of the natural soil for filtration and purification of wastewater from an on-site septic system.

3.3 *on-site septic system, n*—any wastewater treatment and disposal system that uses a septic tank or functionally equivalent device for collecting waste solids and treats wastewater using natural soils, or constructed filter beds with disposal of the treated wastewater into the natural soil.

3.4 *potentially suitable field area, n*—the portions of a site that remain after observable limiting surface features, such as excessive slope, unsuitable landscape position, proximity to water supplies, and applicable setbacks, have been excluded.

3.5 *recommended field area, n*—the portion of the potentially suitable field area at a site that has been determined to be most suitable for an on-site septic system soil absorption field or filter bed based on surface and subsurface observations.

3.6 *soil absorption area, n*—an area of natural soil used for filtration and purification of wastewater from an on-site septic system.

3.7 *soil absorption field area, n*—an area that includes soil absorption trenches and any soil barriers between the trenches. Also called a *leachfield*.

3.8 *soil absorption trench, n*—an excavated trench, usually 1.5 to 3 ft wide that receives wastewater for treatment. Also called a *lateral* or *leachline*.

4. Summary of Practice

4.1 This practice describes a procedure using existing information about a site, simple field equipment, and visual observation for identifying and evaluating all significant conditions at the surface of a site, including climate, vegetation, topography, surface drainage, water sources, and human influences (structures, property lines), that may affect the suitability for design and construction of an on-site septic system. The procedure involves exclusion of areas that are unsuitable for natural soil absorption or constructed filter beds as a result of topography, landscape position, and proximity to surface drainage, water sources, and other limiting surface characteristics (structures, utilities, property lines). If no areas at a site comply with applicable regulatory requirements, no additional field investigations are required. This procedure also provides

[1] This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

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[2] *Annual Book of ASTM Standards*, Vol 04.09.

guidance on selection of the specific area or areas at a site for subsurface investigation as covered in Practice D 5921.

5. Significance and Use

5.1 This practice should be used as the initial step for evaluating a site for its potential to support an on-site septic system and to determine the best location for subsurface observations as covered in Practice D 5921.

5.2 This practice should be used by individuals involved with the evaluation of properties for the use of on-site septic systems. Such individuals may be required to be licensed, certified, or meet minimum educational requirements by the local or state regulatory authority. Generally, such individuals should be familiar with the appropriate regulatory requirements governing the design and placement of on-site septic systems for the area of the site being investigated, and at least some experience or training in geomorphology, soils, geology, and hydrology.[3]

5.3 This practice is one step in the design of an on-site septic system that also includes subsurface characterization, see Practice D 5921, staking and protection of the soil absorption or constructed filter bed area, see Practice D 5925, selection of system type, and design of the system size and configuration. Typically, the same individual will perform the surface and subsurface characterization of a site. Local regulation and practice will determine whether the same individual is responsible for all steps in the process of locating and designing an on-site septic system. Effective surface and subsurface characterization of a site for on-site septic systems, however, requires some knowledge of the following for the county or state in which the site is located: (*1*) on-site septic system types typically used for different soil conditions, and (*2*) typical soil absorption/filter bed areas required for different wastewater flow rates and areal soil wastewater loading rates.

6. Field Equipment

6.1 In addition to equipment identified in Practice D 5925, additional equipment useful for site surface investigations include the following:

6.1.1 *Clinometer* or *Hand Level*, and a *Surveyor's* or other rod for slope measurements;

6.1.2 *Hammer, Stakes* and *Flagging*, for marking probe or auger holes and the recommended field area. If an extendable surveyor's rod is used, a tripod for stabilizing the rod may also be useful. Accurate measurement of distances requires a tape measure (30 m or 100 ft), although for many investigations pacing may be adequate for measuring approximate distances.

6.2 At some sites, surveying equipment may be required to determine more definitively suitability for an on-site septic system or to provide additional information at the design stages. Examples of such situations include marginal sites where accurate measurements of a recommended field area are required to determine if the suitable area is large enough and sites where accurate topographic contours are required for engineering design of constructed filter beds. This practice does not address the use of surveying equipment for such purposes.

7. Procedure

7.1 *Preliminary Documentation*—All readily available information about the site should be obtained and reviewed prior to visiting the site.

7.1.1 A survey showing the boundaries of the site is the preferred method for locating the site because it can also serve as a base map for field observations. A legal description of the property can also be used to plot the site on other available maps or for drawing a sketch map of the site. A topographic survey with contour intervals of 1 to 5 ft will facilitate preliminary identification of potentially suitable field areas and final map preparation. Usually, such maps will not be available unless the site is part of a larger planned subdivision.

7.1.2 The following information concerning local or state regulatory on-site septic system siting requirements should be available for field reference, if required:

7.1.2.1 Minimum separation distance between soil absorption or constructed filter fields and water supply, property lines and other surface and subsurface features,[4]

7.1.2.2 Wastewater hydraulic loading rates for different soil texture, structure and other field observable soil properties,[5]

7.1.2.3 Selection criteria for alternative on-site septic system designs (that is, depth to seasonal high water table, depth to limiting soil layer, slope, and so forth), and

7.1.2.4 Other site-specific features that may affect design of on-site septic systems, such as perimeter drain clearances, and wastewater loading rates.

7.1.3 If the site is undeveloped, the following information should be obtained, prior to visiting the site:

7.1.3.1 Planned location and size of the house or commercial structure,

7.1.3.2 Planned location of water well, if applicable, water lines, and other buried utilities, and

7.1.3.3 Information required for determining wastewater load rates and strength for septic system design (that is, number of bedrooms, number of full-time employee equivalents and shifts per day, biological/chemical oxygen demand). Practice D 5925 addresses in more detail wastewater hydraulic loading and strength considerations in sizing on-site septic systems.

7.1.4 A published soil survey prepared by the U.S. Natural Resource Conservation Service (formerly Soil Conservation Service) is the best single background reference on subsurface conditions for an on-site septic system field investigation. Plotting the site boundaries on the soil map and reviewing information in the soil survey report provide a preliminary indication of climate, topography, geology, hydrology, and types of limiting soil conditions that may be encountered, such as shallow bedrock or ground water.

7.1.5 Potentially useful supplemental materials include: (*1*) USGS 7.5-ft topographic maps, (*2*) aerial photographs, (*3*) well logs, (*4*) wetland inventories, (*5*) state and USGS geologic and

[3] National Small Flows Clearinghouse (NFSC), 1995. *Site Evaluation from the State Regulations.* NFSC, Morgantown, WV.

[4] National Small Flows Clearinghouse (NFSC), 1995. *Location and Separation Guidelines from the State Regulations.* NFSC, Morgantown, WV.

[5] National Small Flows Clearinghouse (NFSC), 1995. *Application Rates and Sizing of Fields from the State Regulations.* NFSC, Morgantown, WV.

hydrologic reports, and (*6*) adjacent or previous septic system evaluations, designs, or permits.

7.2 *Scheduling*—The investigation should be scheduled for a time and date that allows all parties interested or required for the investigation to be present. People who may need to be present for part or all of the investigation include the property owner, the construction contractor, a backhoe operator, and a representative of the on-site septic system permitting authority.

7.3 *Identification of Unsuitable Areas*—At a site, the characterization process begins with identification of all areas of the site that a clearly unsuitable for a wastewater soil absorption field or constructed filter bed. Specific exclusionary features and criteria for defining them will depend upon regulatory requirements and guidance identified in 7.1.2. Such exclusionary features typically fall into three categories: (*1*) water supply separation distances, (*2*) other buffer zones, and (*3*) limiting physiographic features. When most of the area at a site is potentially suitable, it may be possible to go directly to the subsurface investigation phase described in 7.4.

7.3.1 *Water Supply*—Identify and mark on the investigation map water supply sources (drinking water and irrigation wells, reservoirs) and water supply lines. Include both existing and planned locations for new sources. Note minimum required separation distance from on-site septic systems for all identified features.

7.3.2 *Other Buffer Zones*—Identify and mark on the investigation map all other features requiring separation distances, such as building foundations, property lines, buried utility lines, cuts or embankments, large trees, irrigation ditches, streams, lakes, and wetlands. Include both existing and planned locations for new sources. Note minimum required separation distance from on-site septic systems for all identified features.

7.3.3 *Limiting Physiographic Features*—Identify and delineate on the investigation map all areas that are physiographically unsuitable, such as severely eroded or gullied soils, disturbed soils (cut and fill), excessively steep slopes, unsuitable landscape position (toe slopes, concave slopes, depressional areas), and flood plains. Actual criteria for identifying limiting physiographic features will be based on regulatory requirements identified in 7.1.2.

7.4 *Subsurface Investigations*—The area that remains after all minimum separation distances, buffer zones, and unsuitable physiographic features have been excluded represents the potentially suitable field area for an on-site septic system. Subsurface observations, as covered in Practice D 5921 may identify unsuitable or limiting subsurface conditions that will limit further the potentially suitable field area.

7.5 *Recommended Field Area*—The portion of the potentially suitable field area at a site that is most suitable for an on-site septic system soil absorption field or filter bed based on surface and subsurface observations should be delineated on the investigation map as the recommended field area. This area should be staked and protected from disturbance during construction activities as covered in Practice D 5925. Practice D 5925 also provides guidance on the size of area that should be included in the recommended field area.

7.5.1 The recommended field area should include the area that, taking into account limiting surface and subsurface conditions at the site, provides the greatest flexibility in selection and design of an on-site septic system. Placing the field at a lower topographic position than the septic tank outfall allows the option of either gravity or pumped distribution of wastewater where soils are suitable for drainfields.

7.5.2 The recommended field area usually will represent a smaller area than the potentially suitable field area and the area to which subsurface observations in accordance with Practice D 5921 can be extrapolated reasonably. Moving the actual field area to a different location generally will require additional subsurface observations to confirm suitability.

8. Report

8.1 Reporting of results of the surface investigations should be integrated with the results of the subsurface investigation. The local or state regulatory authority may have developed forms or formats for investigation reports, in which case, these should be used.

8.2 Basic elements of an on-site septic system site investigation report include:

8.2.1 A vicinity map and directions to the site,

8.2.2 General site information,

8.2.3 A sketch map,

8.2.4 Identification of surface and subsurface features that limit suitability for an on-site septic system, and

8.2.5 Detailed information about the surface and subsurface characteristics of the recommended field area that are pertinent to the design of the on-site septic system.

8.3 Generally, unless desired by the appropriate septic system permitting agency, the report should not contain recommendations for possible options to overcome limiting features in the recommended field area or recommend the type or types of septic system that might be suitable for the site.

9. Keywords

9.1 field investigations; preliminary investigations; septic systems; site characterization; site investigations

APPENDIX

(Nonmandatory Information)

X1. Related Publications

X1.1 American Society of Agricultural Engineers. 1975–1994. *On-Site Waste Water Treatment Proceedings Series*. Proc. of the 1st Nat. Home Sewage Treatment Symposium (1975), 2nd (1977, 292 pp.); Proc. 3rd Nat. Symp. on Individual and Small Community Sewage Treatment (1981, 352 pp.); 4th (ASAE Pub. 07-85, 1984, 381 pp.); 5th (ASAE Pub. 10-87, 1987, 411 pp.); 6th (ASAE Pub. 10-91, 1991, 375 pp.); Proc. 7th Int. Symp. on Individual and Small Community Sewage Systems (E. Collins, ed., 1994, 578 pp.)

X1.2 Burks, B. D., and Minnis, M. M., *Onsite Wastewater Treatment Systems*. Hogarth House, Madison, WI 1994, 248 pp.

X1.3 Kaplan, O. B. 1991. *Septic Systems Handbook*, Second Edition. Lewis Publishers, Chelsea, MI, 434 pp.

X1.4 Canter, L. W. and R. C. Knox. 1985. *Septic Tank Systems Effects on Ground Water Quality*. Lewis Publishers, Chelsea, MI.

X1.5 Perkins, R. J. 1989. *Onsite Wastewater Disposal*. Lewis Publishers, Chelsea, MI 251 pp. [Chapter 3 covers selection of site and system]

X1.6 National Small Flows Clearinghouse (NFSC). 1995. *State Regulation Compilations* (updated annually): Site Evaluation from the State Regulations (Pub. No. WWPCRG27); Location and Separation Guidelines from the State Regulations (Pub. No. WWPCRG20); Application Rates and Sizing of Fields from the State Regulations (Pub. No. WWPCRG19); Percolation Tests from the State Regulations (WWPCRG22). NFSC, West Virginia University, P.O. Box 6064, Morgantown, WV 26506-8301, 800/624-8301.

X1.7 U.S. Environmental Protection Agency. 1980. Design Manual: Onsite Wastewater Treatment and Disposal Systems. EPS/625/1-80-012. [Chapter 3 covers site evaluation procedures]

X1.8 U.S. Environmental Protection Agency (EPA). 1986. Septic Systems and Groundwater Protection: A Program Manager's Guide and Reference Book. EPA/440/6-86/005 (NTIS PB88-112123), 134 pp.

X1.9 University of Washington College of Engineering. 1976–1992. *Proceedings of the Northwest On-Site Wastewater Disposal Short Course*: 1st (1976); 2nd (1978, R. W. Seabloom, ed., 287 pp., 16 papers); 3rd (1980, R. W. Seabloom, ed., 374 pp., 21 papers); 4th (1982, R. W. Seabloom, ed., 382 pp., 19 papers); 5th (1985, R. W. Seabloom and D. Lenning, and D. Stenset, eds., 299 pp., 18 papers); 6th (1989, R. W. Seabloom and D. Lenning, eds., 431 pp., 24 papers); 7th (1992, R. W. Seabloom, ed., 380 pp., 26 papers). Office of Engineering Continuing Education, University of Washington, 4725 30th Ave., NE, Seattle, WA 98105.

X1.10 Winneberger, J. T. 1984. Septic Tank Systems. Butterworth Publishers, Stoneham, MA.