

Glossary

Absorption: The process by which one substance is taken into and included within another substance, such as the absorption of water by soil or nutrients by plants.

Activated sludge process: A biological wastewater treatment process in which biologically active sludge is agitated and aerated with incoming wastewater. The activated sludge is subsequently separated from the treated wastewater (mixed liquor) by sedimentation, and most of it is returned to the process. The rest is wasted as needed.

Adsorption: The increased concentration of molecules or ions at a surface, including exchangeable cations and anions on soil particles. The adherence of a dissolved solid to the surface of a solid.

Aerobic: Having molecular oxygen as a part of the environment, or growing or occurring only in the presence of molecular oxygen, as in “aerobic organisms.”

Aerobic treatment unit (ATU): A mechanical onsite treatment unit that provides secondary wastewater treatment by mixing air (oxygen) and aerobic and facultative microbes with the wastewater. ATUs typically use a suspended growth treatment process (similar to activated sludge extended aeration) or a fixed film treatment process (similar to trickling filter).

Alternative onsite wastewater treatment system: An onsite treatment system that includes components different from those used in a conventional septic tank and drain field system. An alternative system is used to achieve acceptable treatment and dispersal/discharge of wastewater where conventional systems may not be capable of meeting established performance requirements to protect public health and water resources. (e.g., at sites where high ground water, low-permeability soils, shallow soils, or other conditions limit the infiltration and dispersal of wastewater or where additional treatment is needed to protect ground water or surface water quality). Components that might be used in alternative systems include sand filters, aerobic treatment units, disinfection devices, and

alternative SWISs such as mounds, gravelless trenches, and pressure and drip distribution.

Anaerobic: Characterized by the absence of molecular oxygen, or growing in the absence of molecular oxygen (as in “anaerobic bacteria”).

Anaerobic upflow filter: A high-specific-surface anaerobic reactor filled with a solid media through which wastewater flows; used to pretreat high-strength wastewater or to denitrify nitrified wastewater.

Biochemical oxygen demand (BOD): A commonly used gross measurement of the concentration of biodegradable organic impurities in wastewater. The amount of oxygen, expressed in milligrams per liter (mg/L), required by bacteria while stabilizing, digesting, or treating organic matter under aerobic conditions is determined by the availability of material in the wastewater to be used as biological food and the amount of oxygen used by the microorganisms during oxidation.

Biomat: The layer of biological growth and inorganic residue that develops at the wastewater-soil interface and extends up to about 1 inch into the soil matrix. The biomat controls the rate at which pretreated wastewater moves through the infiltrative surface/zone for coarse- to medium-textured soils. This growth may not control fluxes through fine clay soils, which are more restrictive to wastewater flows than the biomat.

Blackwater: Liquid and solid human body waste and the carriage waters generated through toilet usage.

Centralized wastewater treatment system: A wastewater collection and treatment system that consists of collection sewers and a centralized treatment facility. Centralized systems are used to collect and treat wastewater from entire communities.

Chemical oxygen demand (COD): A measure of oxygen use equivalent to the portion of organic matter that is susceptible to oxidation by a strong chemical oxidizing agent.

Chlorine residual: The total amount of chlorine (combined and free available chlorine) remaining in water, sewage, or industrial wastes at the end of a specified contact period following disinfection.

Clarifiers: Settling tanks that typically remove settleable solids by gravity.

Class V injection well: A shallow well used to place a variety of fluids at shallow depths below the land surface, including a domestic onsite wastewater treatment system serving more than 20 people. USEPA permits these wells to inject wastes below the ground surface provided they meet certain requirements and do not endanger underground sources of drinking water.

Clay: A textural class of soils consisting of particles less than 0.002 millimeters in diameter.

Cluster system: A wastewater collection and treatment system under some form of common ownership and management that provides treatment and dispersal/discharge of wastewater from two or more homes or buildings but less than an entire community.

Coliform bacteria: A group of bacteria predominantly inhabiting the intestines of humans or other warm-blooded animals, but also occasionally found elsewhere. Used as an indicator of human fecal contamination.

Colloids: The solids fraction that is described as the finely divided suspended matter that will not settle by gravity and is too large to be considered dissolved matter.

Compliance boundary: A performance boundary with enforceable performance limits (through an operating permit).

Consistence: Attribute of soil expressed in degree of cohesion and adhesion, or in resistance to deformation or rupture. Consistence includes the resistance of soil material to rupture; resistance to penetration; the plasticity, toughness, or stickiness of puddled soil material; and the manner in which the soil material behaves when subjected to compression. General classifications of soil consistence include loose, friable, firm, and extremely firm.

Constructed wetland: An aquatic treatment system consisting of one or more lined or unlined basins,

some or all of which may be filled with a treatment medium and wastewater undergoing some combination of physical, chemical, and/or biological treatment and evaporation and evapotranspiration by means of macrophytes planted in the treatment medium.

Construction permit: A permit issued or authorized by the regulatory authority that allows the installation of a wastewater treatment system in accordance with approved plans and applicable codes.

Continuous-flow, suspended-growth aerobic system: A typical activated sludge process.

Conventional onsite system: A wastewater treatment system consisting of a septic tank and subsurface wastewater infiltration system.

Decentralized system: Onsite and/or cluster wastewater systems used to treat and disperse or discharge small volumes of wastewater, generally from dwellings and businesses that are located relatively close together. Decentralized systems in a particular management area or jurisdiction are managed by a common management entity.

Denitrification: The biochemical reduction of nitrate or nitrite to gaseous molecular nitrogen or an oxide of nitrogen.

Digestion: The biological decomposition of organic matter in sludge, resulting in partial gasification, liquefaction, and mineralization.

Disinfection: The process of destroying pathogenic and other microorganisms in wastewater, typically through application of chlorine compounds, ultraviolet light, iodine, ozone, and the like.

Dissolved oxygen (DO): The oxygen dissolved in water, wastewater, or other liquid, usually expressed in milligrams per liter (mg/L), parts per million (ppm), or percent of saturation.

Dissolved solids: The fraction of solids dissolved in water.

Drain field: Shallow, covered, excavation made in unsaturated soil into which pretreated wastewater is discharged through distribution piping for application onto soil infiltration surfaces through porous media or manufactured (gravelless) components

placed in the excavations. The soil accepts, treats, and disperses wastewater as it percolates through the soil, ultimately discharging to groundwater.

Effluent: Sewage, water, or other liquid, partially or completely treated or in its natural state, flowing out of a septic tank, subsurface wastewater infiltration system, aerobic treatment unit, or other treatment system or system component.

Effluent filter (also called an **effluent screen**): A removable, cleanable device inserted into the outlet piping of the septic tank designed to trap excessive solids due to tank upsets that would otherwise be transported to the subsurface wastewater infiltration system or other downstream treatment components.

Effluent screen: See *Effluent filter*.

Engineered design: An onsite or cluster system that is designed to meet specific performance requirements for a particular site as certified by a licensed professional engineer or other qualified and licensed or certified person.

Environmental sensitivity: The relative susceptibility to adverse impacts of a water resource or other environments that may receive wastewater discharges.

Eutrophic: A term applied to water that has a concentration of nutrients optimal, or nearly so, for plant or animal growth. In general, nitrogen and phosphorus compounds contribute to eutrophic conditions in coastal and inland fresh waters, respectively.

Evapotranspiration: The combined loss of water from a given area and during a specified period of time by evaporation from the soil or water surface and by transpiration from plants.

Fixed-film wastewater treatment system: A biological wastewater treatment process that employs a medium such as rock, plastic, wood, or other natural or synthetic solid material that will support biomass on its surface. Fixed-film systems include those in which the medium is held in place and is stationary relative to fluid flow (tricking filter), those in which the medium is in motion relative to the wastewater (e.g., rotating biological disk), and dual process systems that include both fixed and suspended biomass together or in a series.

Graywater: Wastewater drained from sinks, tubs, showers, dishwashers, clothes washers, and other non-toilet sources.

Hydraulic conductivity: As applied to soils, the ability of the soil to transmit water in liquid form through pores.

Laminar: Used to describe flat, sheet-like ground water flows that migrate laterally along the upper surface of a confining layer of soil or rock.

Management entity: An entity similar to a responsible management entity, but managing a limited set of management activities (e.g., homeowners' association, contracted provider of management services).

Management services: Planning, design, permitting, inspection, construction/installation, operation, maintenance, monitoring, enforcement, and other services required to ensure that the wastewater treatment performance requirements established by the regulatory authority are achieved. Management services should be provided by properly trained personnel and tracked by means of a comprehensive management information system.

Mineralization: The conversion of an element from an organic form to an inorganic state as a result of microbial decomposition.

Mottling: Spots or blotches of different colors or shades of color interspersed with the dominant soil color caused in part by exposure to alternating unsaturated and saturated conditions.

Nitrification: The biochemical oxidation of ammonium to nitrate.

Nonconventional onsite wastewater treatment system: System using technologies or combinations of technologies that are used where conventional onsite treatment systems cannot meet established performance or prescriptive requirements because of limiting site conditions. Also referred to as *Alternative onsite wastewater treatment systems*.

Onsite wastewater treatment system (OWTS): A system relying on natural processes and/or mechanical components that is used to collect, treat, and disperse/discharge wastewater from single dwellings or buildings.

Operating permit: A renewable and revocable permit to operate and maintain an onsite or cluster treatment system in compliance with specific operational or performance requirements.

Organic nitrogen: Nitrogen combined in organic molecules such as proteins and amino acids.

Organic soil: A soil that contains a high percentage (more than 15 to 20 percent) of organic matter throughout the soil column.

Package plant: Term commonly used to describe an aerobic treatment unit serving multiple dwellings or an educational, health care, or other large facility.

Particle size: The effective diameter of a particle, usually measured by sedimentation or sieving.

Particle-size distribution: The amounts of the various soil size fractions in a soil sample, usually expressed as weight percentage.

Pathogenic: Causing disease; commonly applied to microorganisms that cause infectious diseases.

Ped: A unit of soil structure such as an aggregate, crumb, prism, block, or granule, formed by natural processes.

Perched water table: The permanent or temporary water table of a discontinuous saturated zone in a soil.

Percolation: The flow or trickling of a liquid downward through a contact or filtering medium.

Performance-based management program: A program designed to preserve and protect human health and environmental resources by focusing on the achievement of specific, measurable performance requirements based on site assessments.

Performance boundaries: The point at which a wastewater treatment performance requirement corresponding to the desired level of treatment at that point in the treatment sequence is applied. Performance boundaries can be designated at the discharge point of the pretreatment system (e.g., septic tank, package plant discharge to surface waters), at physical boundaries in the receiving environment (impermeable strata, ground water table), at a point of use (ground water well), or at a property boundary.

Performance requirement: Any requirement established by the regulatory authority to ensure future compliance with the public health and environmental goals of the community. Performance requirements can be expressed as numeric limits (e.g., pollutant concentrations, mass loads, wet weather flows, structural strength) or narrative descriptions of desired performance, such as no visible leaks or no odors.

Permeability: The ability of a porous medium such as soil to transmit fluids or gases.

pH: A term used to describe the hydrogen ion activity of a system.

Physical boundaries: Points in the flow of wastewater through the treatment system where treatment processes change. A physical boundary can be at the intersection of unit processes or between saturated and unsaturated soil zones. A physical boundary may also be a performance boundary if so designated by the regulatory authority.

Plastic soil: A soil capable of being molded or deformed continuously and permanently by relatively moderate pressure.

Platy structure: Laminated or flaky soil aggregate developed predominantly along the horizontal axes.

Prescriptive-based management program: Program that applies predetermined requirements such as site characteristics, design standards, and separation distances to permit or otherwise allow the operation of onsite wastewater treatment systems. This type of program requires that proposed sites meet preset specifications that are perceived to protect public health and the environment.

Prescriptive requirements: Standards or specifications for design, siting, and other procedures and practices for onsite or cluster system applications. Proposed deviations from the specified criteria, procedures, or practices require formal approval by the regulatory authority.

Pretreatment system: Any technology or combination of technologies that precedes discharge to a subsurface wastewater infiltration system or other final treatment unit or process before final dissemination into the receiving environment.

Regulatory authority (RA): The level of government that establishes and enforces codes related to the permitting, design, placement, installation, operation, maintenance, monitoring, and performance of onsite wastewater treatment systems.

Residuals: The solids generated and retained during the treatment of domestic sewage in treatment system components, including sludge, scum, and pumpings from grease traps, septic tanks, aerobic treatment units, and other components of an onsite or cluster system.

Responsible management entity (RME): An entity responsible for managing a comprehensive set of activities delegated by the regulatory authority; a legal entity that has the managerial, financial, and technical capacity to ensure the long-term, cost-effective operation of onsite and/or cluster water treatment systems in accordance with applicable regulations and performance requirements (e.g., a wastewater utility or wastewater management district).

Sand filter: A packed-bed filter of sand or other granular materials used to provide advanced secondary treatment of settled wastewater or septic tank effluent. Sand/media filters consist of a lined (e.g., impervious PVC liner on sand bedding) excavation or structure filled with uniform washed sand that is placed over an underdrain system. The wastewater is dosed onto the surface of the sand through a distribution network and allowed to percolate through the sand to the underdrain system, which collects the filter effluent for further processing or discharge.

Septage: The liquid, solid, and semisolid material that results from wastewater pretreatment in a septic tank, which must be pumped, hauled, treated, and disposed of properly (i.e., in accordance with 40 CFR Part 503).

Septic tank: A buried, preferably watertight tank designed and constructed to receive and partially treat raw wastewater. The tank separates and retains settleable and floatable solids suspended in the raw wastewater. Settleable solids settle to the bottom to form a sludge layer. Grease and other light materials float to the top to form a scum layer. The removed solids are stored in the tank, where they undergo liquefaction in which organic solids are partially broken down into dissolved fatty acids

and gases. Gases generated during liquefaction of the solids are normally vented through the building's plumbing stack vent.

Sequencing batch reactor: A sequential suspended-growth (activated sludge) process in which all major steps occur in the same tank in sequential order. Sequencing batch reactors include intermittent-flow batch reactors and continuous-flow systems.

Settleable solids: Matter in wastewater that will not stay in suspension during a designated settling period.

Silt: A textural class of soils consisting of particles between 0.05 and 0.002 millimeters in diameter.

Soil horizon: A layer of soil or soil material approximately parallel to the land surface and different from adjacent layers in physical, chemical, and biological properties or characteristics such as color, structure, texture, consistence, and pH.

Soil map: A map showing the distribution of soil types or other soil mapping units in relation to the prominent physical and cultural features of the earth's surface.

Soil morphology: The physical constitution, particularly the structural properties, of a soil profile as exhibited by the kinds, thickness, and arrangement of the horizons in the profile and by the texture, structure, consistence, and porosity of each horizon.

Soil structure: The combination or arrangement of individual soil particles into definable aggregates, or peds, which are characterized and classified on the basis of size, shape, and degree of distinctness.

Soil survey: The systematic examination, description, classification, and mapping of soils in an area.

Soil texture: The relative proportions of the various soil separates (e.g., silt, clay, sand) in a soil.

Soil water: A general term emphasizing the physical rather than the chemical properties and behavior of the soil solution.

Subsoil: In general, that part of the soil below the depth of plowing.

Subsurface wastewater infiltration system

(SWIS): An underground system for dispersing and further treating pretreated wastewater. The SWIS includes the distribution piping/units, any media installed around or below the distribution components, the biomat at the wastewater-soil interface, and the unsaturated soil below.

Topsoil: The layer of soil moved in agricultural cultivation.

Total Kjeldahl nitrogen (TKN): An analytical method for determining total organic nitrogen and ammonia.

Treatment system: Any technology or combination of technologies (treatment trains or unit processes) that discharges treated wastewater to surface waters, ground water, or the atmosphere.

Unsaturated flow: Movement of water in a soil that is not filled to capacity with water.

Vegetated submerged bed: A constructed wetland wastewater treatment unit characterized by anaerobic horizontal subsurface flow through a fixed-film medium that has a growth of macrophytes on the surface.

Water quality-based performance requirement: A specific, measurable, and enforceable standard that establishes limits for pollutant concentrations or mass loads in treated wastewater discharged to ground water or surface waters.

Water quality criteria: A set of enforceable requirements under the Clean Water Act that establish measurable limits for specific pollutants based on the designated use(s) of the receiving water body. Water quality criteria can be expressed as numeric limits (e.g., pollutant concentrations or mass loads) or narrative descriptions of desired conditions (e.g., no visible scum, sludge, sheens, or odors).

Water quality standards: A set of enforceable requirements under the Clean Water Act that include classification of receiving waters in accordance with their federal or state designated use(s), use-based water quality criteria that establish measurable limits for specific pollutants, and antidegradation provisions to ensure that water quality is maintained or improved.

Water table: The level in saturated soil at which the hydraulic pressure is zero.