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**OSSF Operations Answer Key**

**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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*This course contains general EPA’s CWA federal rule requirements.  Please be aware that each state implements wastewater/safety/environmental /building regulations that may be more stringent than EPA’s regulations.  Check with your state environmental/health agency for more information. These rules change frequently and are often difficult to interpret and follow. Be careful to not be in non-compliance and do not follow this course for proper compliance.*

**Please fax the answer key to TLC**

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We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your Answer Key and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. **(S) Means answer may be plural or singular**. **Multiple Choice Section, One answer per question and please use the answer key.**

**Onsite Treatment Processes**

1. Onsite sewage treatment systems provide septic system owners with best management practices to keep their \_\_\_\_\_\_\_\_\_\_\_\_functioning properly.

A. Conventional system(s) D. Volumes of treated wastewater

B. The tank effluent E. Primary and secondary treatment

C. Septic systems F. None of the Above

2. These practices are really about recycling water: cleaning \_\_\_\_\_\_\_\_\_\_\_and returning safe water to the water cycle. If a septic system is not functioning properly, clean water is not returned to our groundwater systems.

A. Sewage D. Collection system

B. Wastewater E. Centralized wastewater treatment

C. Septic system F. None of the Above

3. Wastewater flow and strength, site and local infrastructure conditions, and performance requirements for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are all key considerations in deciding what type of wastewater collection and treatment system is needed and how it should be designed.

A. Sewage D. Collection system

B. Dispersed or discharged effluent E. Centralized wastewater treatment

C. Septic system F. None of the Above

4. When functioning properly, onsite systems prevent human contact with\_\_\_\_\_\_\_\_\_, and prevent contamination of surface and groundwater.

A. Wastewater D. Biological and chemical processes

B. Onsite sewage treatment E. Wastewater collection and treatment

C. Sewage F. None of the Above

5. Which of the following terms are designed to accomplish the same thing—the treatment of wastewater—but how this is accomplished is based on the type of treatment technology used.

A. Individual and clustered wastewater systems D. Collection system(s)

B. Wastewater system(s) E. Centralized wastewater system(s)

C. Septic system(s) F. None of the Above

**Primary Treatment**

6. Physical treatment processes involving capture of solids and fats/oils/grease in an enclosed vessel, typically by settling and flotation, such as provided in a septic tank or grease interceptor tank. This process also includes trapping of solids via \_\_\_\_\_\_\_\_\_\_\_or screens prior to discharge of the tank effluent.

A. Conventional system(s) D. Septic tank effluent filters

B. The tank effluent E. Primary and secondary treatment

C. The quantity of contaminants F. None of the Above

**Secondary Treatment**

7. Which of the following terms designed to remove organic matter, mostly through digestion and decomposition, often aided by introduction of or exposure to atmospheric oxygen.

A. Wastewater D. Biological and chemical processes

B. Onsite sewage treatment E. Wastewater collection and treatment

C. Enhanced organic matter removal F. None of the Above

8. A typical standard for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations less than or equal to 20 mg/L each on a 30-day average basis.

A. Wastewater D. Biological and chemical processes

B. Onsite sewage treatment E. Wastewater collection and treatment

C. Enhanced organic matter removal F. None of the Above

**Tertiary (Advanced) Treatment**

9. Which of the following terms includes enhanced organic matter removal, pathogen reduction, and nutrient removal. Standards for advanced or tertiary effluent vary according to regulatory requirements.

A. Advanced treatment of wastewater D. Biological and chemical processes

B. Onsite sewage treatment E. Wastewater collection and treatment

C. Enhanced organic matter removal F. None of the Above

10. Which of the following terms parameters can include nitrate-nitrogen, phosphorus, and bacteria (fecal coliform less than 10 colony forming units per 100 ml).

A. Conventional system(s) D. Volumes of treated wastewater

B. The tank effluent E. Typical effluent quality

C. The quantity of contaminants F. None of the Above

11. Which of the following terms can occur via process controls or through exposure to additives or media designed to cause chemical or other reactions?

A. Advanced treatment D. Biological and chemical processes

B. Onsite sewage treatment E. Wastewater collection and treatment

C. Enhanced organic matter removal F. None of the Above

**Conventional Systems**

12. Which of the following terms are the most commonly used wastewater treatment technologies, combining primary and secondary treatment?

A. Conventional system(s) D. Volumes of treated wastewater

B. The tank effluent E. Conventional treatment systems

C. The quantity of contaminants F. None of the Above

***(s) means the answer may be plural or singular in nature.***

13. Which of the following terms consists of a septic tank and a soil absorption field that allows primary treatment effluent to infiltrate into unsaturated soil?

A. A conventional wastewater treatment system D. Volumes of treated wastewater

B. The tank effluent E. Primary and secondary treatment

C. The quantity of contaminants F. None of the Above

14. Which of the following terms can serve individual homes or businesses, or clusters of buildings?

A. Conventional system(s) D. Volumes of treated wastewater

B. The tank effluent E. Primary and secondary treatment

C. The quantity of contaminants F. None of the Above

15. The septic tank treats \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_by allowing floatable materials to rise to the surface, forming a scum layer, and the heavier solids to sink to the bottom, creating a layer of sludge.

A. Pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Wastewater

C. Septic tank effluent F. None of the Above

16. Which of the following terms is similar to that of primary sedimentation in larger treatment facilities, except that it is generally devoid of oxygen?

A. Conventional system(s) D. Volumes of treated wastewater

B. The tank effluent E. Primary and secondary treatment

C. The quantity of contaminants F. None of the Above

**Pretreatment Components**

17. Which of the following terms remove many of the contaminants from the wastewater to prepare the effluent for final treatment and dispersal into the environment?

A. Pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Advanced systems

C. Septic tank effluent F. None of the Above

18. Which of the following terms is reduced to a level the soil can accept and treat?

A. Advanced system(s) D. The quantity of contaminants

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

19. Which of the following terms include septic tanks, trash tanks, and processing tanks, while aerobic treatment units, media filters, and constructed wetlands are considered advanced pretreatment components?

A. Wastewater pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Advanced systems

C. Septic tank effluent F. None of the Above

20. Which of the following terms provide the final removal of contaminants and distribute the effluent for dispersal back into the environment?

A. Advanced system(s) D. Pressurized distribution methods

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

21. Which of the following terms are the most widely used dispersal systems.  These systems will continue to be used in areas where the soil separation distances can be met, primarily because they are the least expensive alternative and require the least amount of operation and maintenance.

A. Pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Advanced systems

C. Septic tank effluent F. None of the Above

22. Which of the following terms overcome a variety of site limitations.  Low pressure, subsurface drip, and spray distribution systems are designed to function in difficult areas?

A. Advanced system(s) D. Pressurized distribution methods

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

**Advanced Systems**

23. Treatment system components designed to pretreat septic tank effluent before discharge to the soil dispersal field are often called?

A. Pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Advanced systems

C. Septic tank effluent F. None of the Above

24. Advanced systems can be designed and built on-site or can consist of prefabricated units designed to overcome some site and soil limitations including:

When the aerated soil depth below the infiltrative surface in the drainfield is less than the minimum required, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_or components can be added to increase pollutant removal prior to soil discharge.

A. Advanced system(s) D. Advanced treatment processes

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

25. In environmentally sensitive areas, \_\_\_\_\_\_\_\_\_\_\_\_\_ can be used to meet effluent standards for oxygen-demanding wastes, bacteria, nitrogen, and phosphorus.

A. Pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Advanced systems

C. Septic tank effluent F. None of the Above

26. Which of the following terms malfunctions hydraulically due to a buildup of the biomat at the infiltrative surface, it may be restored, and treatment may be enhanced?

A. Advanced system(s) D. Pressurized distribution methods

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

27. Which of the following terms allows the soil to drain between doses, improving soil oxygen transfer?

A. Advanced system(s) D. Pressurized distribution methods

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

28. Wastewater with high organic strength (e.g., from a restaurant) can employ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to improve aeration, biological decomposition, and treatment of organic wastes.

A. Pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Advanced treatment units/processes

C. Septic tank effluent F. None of the Above

29. Which of the following terms that provide timed dosing of septic tank or treatment unit effluent to the soil can sometimes be used where soil infiltration areas are limited?

A. Advanced system(s) D. Pressurized distribution methods

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

30. Which of the following terms that employ pressure drip dispersal of the effluent can reduce bacteria and nutrient loading to groundwater by applying wastewater high in the soil profile?

A. Pretreatment components D. Septic tanks, trash tanks, and processing tanks

B. Gravity flow systems E. Advanced systems

C. Septic tank effluent F. None of the Above

31. Which of the following terms require management, but advanced systems, due to their use of pumps, switches, and other electromechanical components?

A. Advanced system(s) D. Pressurized distribution methods

B. Septic tank effluent E. Final treatment and dispersal components

C. The dose/rest cycle F. None of the Above

**Elevated (Mound or At-Grade) Systems**

32. This system type includes \_\_\_\_\_\_\_\_\_\_\_\_\_to provide primary (and sometimes secondary) treatment prior to discharging the effluent to a modified drainfield.

A. Pressure distribution D. A septic tank or prefabricated treatment unit

B. Septic tank effluent E. Infiltration area protection

C. Septic system F. None of the Above

33. Effluent flows from the tank or treatment unit to a pump tank and periodically dosed to the\_\_\_\_\_\_\_\_\_\_\_\_\_, which is typically constructed of a layer of clean, uniformly graded sand on a plowed or roughened natural soil surface.

A. At-grade systems D. Modified dispersal area

B. Septic tank effluent E. Aerobic treatment units (ATUs)

C. Soil dispersal field F. None of the Above

34. The tank effluent is uniformly dosed onto the \_\_\_\_\_\_\_\_\_\_\_\_\_within the mound, which may be 1-4 ft. above the natural grade. Sand within the mound compensates for shallow unsaturated soil conditions below the natural grade.

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Infiltrative surface

C. ATU(s) F. None of the Above

**Mound Systems**

35. Which of the following terms are appropriate for areas with a high water table or shallow, fractured bedrock?

A. At-grade systems D. Effluent flows from the tank

B. Septic tank effluent E. Aerobic treatment units (ATUs)

C. Soil dispersal field F. None of the Above

36. The mound should have inspection ports, so wastewater distribution across the infiltration area can be monitored. \_\_\_\_\_\_\_\_\_\_\_\_\_ should have cleanouts so they can be flushed at least twice a year.

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Distribution lines

C. ATU(s) F. None of the Above

**Aerobic Treatment Units**

37. Which of the following terms consist of prefabricated units featuring consecutive or compartmentalized tanks, pumps, blowers, and internal piping, and are designed to treat wastewater via suspended or attached growth decomposition?

A. At-grade systems D. Effluent flows from the tank

B. Septic tank effluent E. Aerobic treatment units (ATUs)

C. Soil dispersal field F. None of the Above

38. Three processes are involved in most\_\_\_\_\_\_\_\_\_\_\_\_: physical separation (mostly settling), aerobic treatment, and clarification.

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Aerobic systems

C. ATU(s) F. None of the Above

39. Which of the following terms vary in design and can consist of simple activated sludge variations, sequencing batch reactors, trickling filters, and combinations of two or more of these unit processes?

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Distribution lines

C. ATU(s) F. None of the Above

**Media Filters**

40. Which of the following terms can be applied to a layer of sand or gravel, a tank containing peat or plastic media, or compartments of hanging textile or other material to improve oxygen access and enhance biochemical treatment processes?

A. Septic tank effluent D. Individual and clustered systems

B. Wastewater E. Infiltration area protection

C. Septic system F. None of the Above

41. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are available to treat wastewater. Sand is the most commonly used media, but clean gravel, crushed glass, textile strips, peat, and tire crumbs are also used, depending on site restrictions and state/local regulations.

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Distribution lines

C. ATU(s) F. None of the Above

42. In single-pass or intermittent filter (ISF) design, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is pump-dosed uniformly onto the media at regular intervals 12 to 48 times per day.

A. At-grade systems D. Effluent flows from the tank

B. Septic tank effluent E. Aerobic treatment units (ATUs)

C. Soil dispersal field F. None of the Above

43. As the effluent trickles through the \_\_\_\_\_\_\_\_\_\_\_\_\_, suspended and some colloidal particles are filtered, and bacteria growing on the media aerobically treat organic wastewater.

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Distribution lines

C. ATU(s) F. None of the Above

44. Effluent that percolates through the media bed is discharged to the?

A. At-grade systems D. Effluent flows from the tank

B. Septic tank effluent E. Aerobic treatment units (ATUs)

C. Soil dispersal field F. None of the Above

**Submerged-Flow Wetland or Vegetative Submerged-Bed (VSB**)

45. Which of the following terms are also called submerged-flow wetlands. This system type treats septic tank effluent by horizontal flow through a lined bed of unmulched gravel planted with wetland species. The plants fill in spaces between the rocks and provide aesthetic appeal.

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Distribution lines

C. ATU(s) F. None of the Above

46. Which of the following terms are extremely passive and require little management in producing a good quality effluent?

A. Septic system(s) D. Collection systems for clustered facilities

B. Cluster system(s) E. Wetland system(s)

C. Treatment facilities F. None of the Above

47. Effluent is further treated when discharged to \_\_\_\_\_\_\_\_\_\_\_\_\_following flow through the wetland cell(s).

A. Media D. Vegetative submerged bed(s)

B. Media filter(s) E. Distribution lines

C. Unsaturated soil F. None of the Above

**Cluster System Applications**

48. The Cluster Wastewater Systems Planning Handbook lists a number of potential wastewater collection technologies for small and large cluster systems, including: grinder pump systems, which transport all sewage; effluent sewers, such as the\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; the septic tank effluent gravity (STEG) collection system; and vacuum systems.

A. Pressure distribution D. Individual and clustered systems

B. Septic tank effluent pump (STEP) E. Infiltration area protection

C. Septic system F. None of the Above

49. Which of the following terms facilities serving clustered buildings may range from a communal septic tank and soil dispersal system to a more advanced treatment system?

A. Treatment D. Individual and clustered systems

B. Wastewater E. Infiltration area protection

C. Septic system F. None of the Above

50. Advanced systems may facilitate local reuse of the treated effluent for toilet flushing, irrigation, industrial purposes, or to replenish?

A. Aerobic microsite(s) D. Microbes and other particles

B. All sewage E. Waterborne illnesses

C. Aquifer(s) F. None of the Above

51. Which of the following terms must be managed by an entity with the technical, financial, and managerial capacity to effectively and efficiently handle operation, maintenance, customer billing, repair/replacement, and other tasks?

A. Septic system(s) D. Collection systems for clustered facilities

B. Cluster system(s) E. Wetland system(s)

C. Treatment facilities F. None of the Above

**Septic System Failures**

52. Septic system failures are a major source of groundwater pollution. Layers of soil act as a natural filter, removing microbes and other particles as water seeps through. Improperly treated water can carry \_\_\_\_\_\_\_\_\_\_\_\_that can cause gastroenteritis, fever, common cold, respiratory infections and hepatitis.

A. Aerobic microsite(s) D. Microbes and other particles

B. All sewage E. Waterborne illnesses

C. Bacteria and viruses F. None of the Above

53. Septic system maintenance is like automobile maintenance; a little effort on a regular basis can save you a lot of money and significantly prolong the life of the?

A. Septic system(s) D. Collection systems for clustered facilities

B. Cluster system(s) E. System

C. Treatment facilities F. None of the Above

54. Failing systems are a major source of groundwater pollution, cause \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, such as dysentery and hepatitis, and are expensive for homeowners to replace. There are many different types of wastewater collection and treatment technologies.

A. Aerobic microsite(s) D. Microbes and other particles

B. All sewage E. Waterborne illnesses

C. Aquifer(s) F. None of the Above

55. Systems can treat individual homes, clusters of buildings, or whole subdivisions and/or commercial establishments. \_\_\_\_\_\_\_\_\_\_\_ for clustered facilities can work by gravity or operate via vacuum or pressure pump.

A. Septic system(s) D. Collection systems

B. Cluster system(s) E. Wetland system(s)

C. Treatment facilities F. None of the Above

56. Wastewater is typically treated through primary and secondary processes (and sometimes tertiary or\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) and can be disinfected prior to discharge.

A. Advanced “polishing” procedures D. Individual and clustered systems

B. Wastewater E. Infiltration area protection

C. Septic system F. None of the Above

**Improving OSSF Treatment through Performance Requirements**

57. Most onsite wastewater treatment systems are of the conventional type, consisting of a septic tank and a?

A. Regular maintenance D. Subsurface wastewater infiltration system (SWIS)

B. Drainage features E. Approving the use of various treatment technologies

C. Septic system F. None of the Above

58. Over the past 20 years the onsite wastewater treatment system industry has developed many \_\_\_\_\_\_\_\_\_\_\_\_\_\_that can achieve high performance levels on sites with size, soil, ground water, and landscape limitations that might preclude installing conventional systems.

A. Performance requirements D. Primary and secondary processes

B. Water resources E. New treatment technologies

C. Fixed-film reactors F. None of the Above

59. New technologies and \_\_\_\_\_\_\_\_\_\_\_\_\_\_are based on defining the performance requirements of the system, characterizing wastewater flow and pollutant loads, evaluating site conditions, defining performance and design boundaries, and selecting a system design that addresses these factors.

A. Alternative treatment technologies D. Performance-based management

B. Existing technologies E. Wastewater characteristics, and site conditions

C. Improvements to existing technologies F. None of the Above

60. Which of the following terms can be expressed as numeric criteria or narrative criteria and are based on the assimilative capacity of regional ground water or surface waters, water quality objectives, and public health goals.

A. Performance requirements D. Primary and secondary processes

B. Water resources E. Onsite wastewater treatment system (OWTS)

C. Fixed-film reactors F. None of the Above

61. Which of the following terms help define system design and size and can be estimated by comparing the size and type of facility with measured effluent outputs from similar, existing facilities?

A. Alternative treatment technologies D. Performance-based management

B. Existing technologies E. Wastewater characteristics, and site conditions

C. Wastewater flow and pollutant content F. None of the Above

62. Which of the following terms integrate detailed analyses of regional hydrology, geology, and water resources with site specific characterization of soils, slopes, structures, property lines, and other site features to further define system design requirements and determine the physical placement of system components?

A. Site evaluations D. Individual and clustered systems

B. Wastewater E. Infiltration area protection

C. Septic system F. None of the Above

63. Which of the following terms based on these technologies are defined by performance requirements, wastewater characteristics, and site conditions?

A. Alternative treatment technologies D. The application and sizing of treatment units

B. Existing technologies E. Wastewater characteristics, and site conditions

C. Wastewater flow and pollutant content F. None of the Above

**Performance-Based Standards**

64. The move toward site-appropriate, risk-based system design and the growing interest in \_\_\_\_\_\_\_\_\_\_\_\_\_\_has increased the need for performance-based design guidance.

A. Performance requirements D. Primary and secondary processes

B. Clustered facilities E. Onsite wastewater treatment system (OWTS)

C. Fixed-film reactors F. None of the Above

65. Which of the following terms approaches have been proposed as a substitute for prescriptive requirements for system design, siting, and operation?

A. Alternative treatment technologies D. Performance-based management

B. Existing technologies E. Wastewater characteristics, and site conditions

C. Wastewater flow and pollutant content F. None of the Above

**System Design Considerations**

66. One of the more common reasons why some individual or cluster systems do not perform properly is inappropriate \_\_\_\_\_\_\_\_\_\_\_\_\_ selection.

A. Soil condition(s) D. Life of system components

B. System/technology E. System compatibility

C. Subsurface drainfield(s) F. None of the Above

67. A wastewater system should be matched to the volume and\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and the site, soil, and groundwater/surface water conditions must be known in detail in order to develop an appropriate system design.

A. Alternative treatment technologies D. Pollutant profile of wastewater

B. Existing technologies E. Wastewater characteristics, and site conditions

C. Wastewater flow and pollutant content F. None of the Above

68. Which of the following terms permitting programs are expanding the options available for providing treatment services?

A. Regular maintenance D. State and local wastewater system

B. Drainage features E. Approving the use of various treatment technologies

C. Septic system F. None of the Above

**Management Considerations**

69. Which of the following terms systems require management?

A. Soil condition(s) D. Life of system components

B. System/technology E. Wastewater treatment

C. Subsurface drainfield(s) F. None of the Above

70. Factors that influence system management include:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, such as very cold or wet climates.

A. Complexity of service D. Operation in extreme conditions

B. Final design components E. Designs and materials specifications

C. All system componentsF. None of the Above

71. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and access to repair parts.

A. Soil condition(s) D. Life of system components

B. System/technology E. System compatibility

C. Subsurface drainfield(s) F. None of the Above

72. Maintenance needs, including frequency and?

A. Complexity of service D. Very cold or wet climates

B. Final design components E. Designs and materials specifications

C. All system componentsF. None of the Above

**Permitting and Approval Process**

73. State and local governments vary considerably in their approach to approving \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and issuing installation and operation permits. Consultation with state and local regulatory agencies is required in all cases to ensure that minimum requirements are met.

In general, a typical permit application procedure should include the following information:

Consultation with the property owner regarding final design components.

A. Complexity of service D. System types and components

B. Final design components E. Designs and materials specifications

C. All system componentsF. None of the Above

74. It is important that the application include\_\_\_\_\_\_\_\_\_\_\_, narratives, forms, calculations, catalog cuts, photos, and other data, including detailed equipment and installation specifications to make siting the system components easier.

A. System drawings D. System maintenance

B. System location and features E. Wastewater treatment system

C. Installation specifications F. None of the Above

75. If the site has been developed, all structures, utilities, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_should be identified.

A. Regular maintenance D. Ingress and egress pathways

B. Drainage features E. Various treatment technologies

C. Septic system F. None of the Above

76. The source of potable water and distribution lines should be identified as well. If there is an existing wastewater treatment system, the condition of all components, including the reserve area, should be recorded and\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

A. Drainage features D. System maintenance

B. System location and features E. Minimum setbacks met

C. Installation specifications F. None of the Above

**Regular Maintenance**

77. Regular maintenance is required for\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. However, it is especially important for more complex alternative systems, especially those that use pumps, controls, timers, and pressure distribution.

A. All systems D. Individual and clustered systems

B. Wastewater systems E. Infiltration area protection

C. Septic systems F. None of the Above

78. Verification of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ contracts, operator expertise, and reporting requirements for system maintenance such as tank pumping and repairs should be included in the approval process.

A. Drainage features D. System maintenance

B. System location and features E. Wastewater treatment system

C. Installation specifications F. None of the Above

**These records should reflect:**

79. The\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If properly designed, installed, and maintained, a septic system can effectively treat household wastewater for up to 20 years or more.

A. Regular maintenance D. Age of the system

B. Drainage features E. Location of the system

C. Size of the system F. None of the Above

80. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Size is important because graywater and blackwater need to be retained in the tank for at least a day or more to allow solids to separate from the liquids and begin breaking down.

A. Regular maintenance D. Age of the system

B. Drainage features E. Location of the system

C. Size of the system F. None of the Above

81. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Knowing where the tank and drainfield are will help you visually check the area for obvious signs of failure.

A. Regular maintenance D. Age of the system

B. Drainage features E. Location of the system

C. Size of the system F. None of the Above

**Testing and Certification**

82. Approving the use of various treatment technologies is under the purview of state and local governments. Some states individually test and validate \_\_\_\_\_\_\_\_\_\_and maintain a list of those approved in their state.

A. Regular maintenance D. Adequate tank size

B. Drainage features E. Treatment technologies

C. Septic system F. None of the Above

**Construction Section**

83. Appropriate wastewater treatment system construction and/or installation practices are critical to the performance of individual and?

A. Pressure distribution D. Clustered systems

B. Wastewater E. Infiltration area protection

C. Septic system F. None of the Above

84. Construction activities can affect short-term and long-term system performance by failing to adhere to \_\_\_\_\_\_\_\_\_\_\_\_\_\_, neglecting proper pipe slope requirements, inadvertently switching tank inlet/outlet orientation, or failing to protect infiltration area soils from equipment compaction.

A. Infiltration area D. Secondary treatment unit(s)

B. Inlet/outlet orientation E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

85. Which of the following terms, a key component of good system installation practice, should be carefully considered during site preparation, construction equipment selection and use, and before and during construction.

A. Pressure distribution D. Individual and clustered systems

B. Wastewater E. Infiltration area protection

C. Septic system F. None of the Above

86. The development of a final design plan that includes drawings, narratives, forms, calculations, photos, and other data, including\_\_\_\_\_\_\_\_\_\_\_\_, will help ensure a successful outcome. This information must be assembled into a cohesive document to allow the proper installation of the design without the need for any assumptions.

A. Infiltration area D. Detailed equipment and installation specifications

B. Inlet/outlet orientation E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

**Preparation Phase**

87. Conduct a pre-construction conference at the site to identify site component locations, verify setbacks and other site conditions, check surface elevations, and identify potential problems or safety concerns (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_).

A. Pressure distribution D. Individual and clustered systems

B. Wastewater E. Infiltration area protection

C. Septic system F. None of the Above

88. Assess changes in conditions (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) that may have occurred since design work was completed.

A. Infiltration area D. Secondary treatment unit(s)

B. Inlet/outlet orientation E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

89. If work will be delayed, flag off or otherwise protect the?

A. Infiltration area(s) D. Gravity flow pipe(s)

B. Site component location(s) E. Designed component finished condition(s)

C. Gravity flow system(s) F. None of the Above

**Project Execution**

90. Verify designed treatment system components and materials, such as tank type, size, and material; piping; and?

A. Infiltration area(s) D. Gravity flow pipe(s)

B. Site component location(s) E. Designed component finished condition(s)

C. Gravity flow system(s) F. None of the Above

91. Excavate areas for conveyance piping, the tank(s), secondary treatment units, and infiltration or soil dispersal components according to designated depths and required?

A. Infiltration area D. Pipe slopes

B. Inlet/outlet orientation E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

92. For\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, all elevations are tied to the building sewer line elevation. Ensure that the proper fall is available from the building to the tank, then to the distribution box(es), and to the infiltration area.

A. Infiltration area(s) D. Gravity flow pipe(s)

B. Site component location(s) E. Designed component finished condition(s)

C. Gravity flow system(s) F. None of the Above

93. Ensure that the tank is on solid tamped ground, installed level and at the proper elevation, and that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is correct. Secure tank covers after hours to prevent accidents. Backfill tanks as soon as possible.

A. Infiltration area D. Secondary treatment unit(s)

B. Inlet/outlet orientation E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

94. Follow manufacturer’s recommendations for?

A. Infiltration area(s) D. Gravity flow pipe(s)

B. Site component location(s) E. Designed component finished condition(s)

C. Installing tanks F. None of the Above

95. Ensure that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are plumbed, wired, and installed to allow easy inspection, access, and removal (e.g., use quick-connect union and backflow prevention valve between pump and uphill dispersal piping).

A. Infiltration area D. Pumps

B. Inlet/outlet orientation E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

96. Ensure that trench bottoms for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are tamped and stable and free of rocks and roots, and that backfilled areas around pipes are tamped to prevent dips and rises that could impede flow.

A. Infiltration area(s) D. Gravity flow pipe(s)

B. Site component location(s) E. Designed component finished condition(s)

C. Gravity flow system(s) F. None of the Above

97. Ensure that \_\_\_\_\_\_\_\_\_\_\_\_\_\_effluent dispersal holes go on the bottom.

A. Infiltration area(s) D. Gravity flow pipe(s)

B. Site component location(s) E. Distribution pipe

C. Gravity flow system(s) F. None of the Above

98. Extend \_\_\_\_\_\_\_\_\_\_\_piping stubs below tank access ports, but do not block ports to ensure access for pumping and inspection. Use rubber boots or grout to completely seal around pipes and risers.

A. Infiltration area D. Secondary treatment unit(s)

B. Inlet/outlet E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

99. Install access \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_to the surface, install outlet filters/screens, and complete installation of pumps, wiring, control panels, and other components.

A. Port risers D. Gravity flow pipe(s)

B. Site component location(s) E. Designed component finished condition(s)

C. Gravity flow system(s) F. None of the Above

100. Install \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in key locations (near building sewer, D-box, etc.); this aids in operation/maintenance later on.

A. Infiltration area D. Cleanouts and inspection ports

B. Inlet/outlet orientation E. Uphill dispersal piping

C. Distribution pipe effluent F. None of the Above

101. Conduct functional test of the system after installation, checking flows, pump discharge (if used), operation of?

A. Infiltration area(s) D. Gravity flow pipe(s)

B. Site component location(s) E. Designed component finished condition(s)

C. Gravity flow system(s) F. None of the Above

**Site Preparation and Excavation Practices**

102. Overhead power lines, steep slopes, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the installation site can all present serious safety hazards. A brief preconstruction meeting can ensure that safety hazards and practices to eliminate, minimize, or respond to them are identified.

A. Compaction D. Excavations

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

103. Site preparation requires a number of activities including clearing and surface preparation for filling. Use of lightweight tracked equipment will minimize soil?

A. Compaction D. Excavation

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

104. Soil \_\_\_\_\_\_\_\_\_\_\_\_\_\_ should be determined to ensure that it is dry, and care should be taken to avoid soil disturbance as much as possible.

A. Compaction D. Excavation

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

105. To avoid potential soil \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_during construction, the soil below the proposed infiltration surface elevation must be below its plastic limit during construction.

A. Compaction D. Excavation

B. Moisture E. Damage

C. Disturbance F. None of the Above

106. Site \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is conducted only when the infiltration surface can be covered the same day to avoid loss of soil permeability from wind-blown silt or raindrop impact.

A. Compaction D. Excavation

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

107. Another solution is to use light-weight gravel-less systems, which reduce the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ process. Site access points and areas for traffic lanes, material stockpiling, and equipment parking should be designated on the drawings for the contractor.

A. Compaction D. Excavation

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

108. Heavy equipment should be diverted from the absorption field to avoid compaction and damage to the area. Flagging off the \_\_\_\_\_\_\_\_\_\_\_\_ area as early as possible is critical to ensure long-term function of the system.

A. Compaction D. Excavation

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

109. Grubbing of the site should be avoided. If the site is to be filled, the surface should be moldboard- or chisel-plowed parallel to the contour when the soil is sufficiently dry to ensure maximum vertical?

A. Compaction D. Permeability

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

110. The organic layer should not be removed. Scarifying the surface with the teeth of a backhoe bucket is not sufficient. All efforts should be made to avoid any disturbance to the exposed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ surface.

A. Compaction D. Excavation

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

**Field Construction Practices**

111. Changes in construction practices over the past 25 years have led to improvements in the performance of?

A. Individual wastewater system(s) D. Long-term system performance

B. Infiltration area E. Distribution pipe(s)

C. System design F. None of the Above

112. Avoid work during wet conditions. \_\_\_\_\_\_\_\_\_\_\_\_\_\_in infiltration trenches should be scarified and the surface gently raked prior to installing the gravel or gravel-less piping/chambers.

A. Compaction D. Excavation

B. Moisture E. Infiltration

C. Smeared soil surfaces F. None of the Above

113. If gravel or crushed rock is to be used for the system medium, the rock should be placed in the trench by using the backhoe bucket to long-term system performance. If soil compaction occurs during drainfield installation, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but only by removing the compacted layer.

A. Individual wastewater system(s) D. Long-term system performance

B. Infiltration area E. Distribution pipe(s)

C. System design F. None of the Above

114. Consequences of the removal of this amount of soil over the entire infiltration surface can be significant. It will reduce the separation distance to the restrictive horizon and could place the infiltration surface in an unacceptable soil?

A. Compaction D. Horizon

B. Moisture E. Infiltration

C. Disturbance F. None of the Above

115. For gravel filled trenches, the trench bottom should be left rough and covered with six inches of clean rock. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ should be carefully placed over the rock, leveled, and bedded in on the sides.

A. Individual wastewater system(s) D. Long-term system performance

B. Infiltration area E. Distribution pipe(s)

C. System design F. None of the Above

116. After the rock and pipes have been placed in the trench, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_should be placed over the top of the rock to prevent soil from moving into the rock. The soil backfill should be carefully crowned to fill the trench cavity at a height to allow for settling.

A. Filter fabric D. Long-term system performance

B. Infiltration area E. Distribution pipe(s)

C. System design F. None of the Above

117. Post construction activities include accurate documentation of all of the system components and the system location. Flag off the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to keep construction and other traffic away.

A. Individual wastewater system(s) D. Long-term system performance

B. Infiltration area E. Distribution pipe(s)

C. System design F. None of the Above

**Management Considerations**

118. All \_\_\_\_\_\_\_\_\_\_\_\_\_\_programs should carefully consider construction and installation elements to ensure the proper operation of onsite systems.

A. Individual wastewater system(s) D. Long-term system performance

B. Infiltration area E. Onsite management

C. System design F. None of the Above

**Construction/Installation Programs Basic Approach** 119.Construction permit based on code-compliant site evaluations and?

A. Individual wastewater system(s) D. Long-term system performance

B. Infiltration area E. Distribution pipe(s)

C. System design F. None of the Above

120. Inspection of systems prior to backfilling to confirm that installation complies with?

A. Activated sludge-based unit(s) D. Effective wastewater management

B. O&M maintenance activities(s) E. Staking of system components

C. Inspection(s) F. None of the Above

**Intermediate Approach** 121.Construction oversight for all critical steps (e.g., field verification and staking of system components, inspections after backfilling, and?

A. Installation completion D. Effective wastewater management

B. O&M maintenance activitie(s) E. Staking of system components

C. Inspection(s) F. None of the Above

**Inspections**

122. Which of the following terms inspections should be conducted by trained and certified personnel at several stages during the system construction and installation process?

A. Installation D. System construction and installation process

B. Clustered wastewater system(s) E. Effluent is discharged or dispersed

C. Subsurface dispersal system(s) F. None of the Above

123. During the construction process, inspections before and after backfilling can help verify compliance with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_procedures.

A. Approved construction D. Effective wastewater management

B. O&M maintenance activitie(s) E. Staking of system components

C. Inspection(s) F. None of the Above

124. The construction process for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must be flexible to accommodate weather events, since construction during wet weather may compact soils at the infiltrative surface or otherwise alter soil structure and should be avoided.

A. Soil-discharging system(s) D. System construction and installation process

B. Clustered wastewater system(s) E. Effluent is discharged or dispersed

C. Subsurface dispersal system(s) F. None of the Above

**Onsite Operation and Maintenance (O&M) Section**

125. Effective wastewater management ultimately hinges on the proper?

A. O&M of systems D. Effective wastewater management

B. O&M maintenance activitie(s) E. Staking of system components

C. Inspection(s) F. None of the Above

126. There are several different management approaches that can be used to support O&M, from mandatory inspection programs to permitting and?

A. Monitoring requirements D. System construction and installation process

B. Clustered wastewater system(s) E. Effluent is discharged or dispersed

C. Subsurface dispersal system(s) F. None of the Above

**System Operation and Maintenance Requirements**

127. Most technologies come with suggested \_\_\_\_\_\_\_\_\_\_\_\_\_\_from the manufacturer. These requirements are crucial to the proper operation and performance of the system.

A. Activated sludge-based unit(s) D. Effective wastewater management

B. O&M maintenance activitie(s) E. Staking of system components

C. Inspection(s) F. None of the Above

**Individual Wastewater Systems**

128. Individual systems generally consist of one or more treatment devices and a?

A. Soil-discharging system(s) D. System construction and installation process

B. Clustered wastewater system(s) E. Effluent is discharged or dispersed

C. Subsurface dispersal system(s) F. None of the Above

129. Mechanical systems, such as \_\_\_\_\_\_\_\_\_\_\_\_\_, require servicing three to four times a year, while conventional systems need service or pumping every three to seven years, depending on occupancy and use.

A. Activated sludge-based unit(s) D. Effective wastewater management

B. O&M maintenance activitie(s) E. Staking of system components

C. Inspection(s) F. None of the Above

**Conventional Systems**

130. In most communities, the operation and maintenance of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is the responsibility of the homeowner.

A. Soil-discharging system(s) D. System construction and installation process

B. Clustered wastewater system(s) E. Conventional systems

C. Subsurface dispersal system(s) F. None of the Above

131. Which of the following terms require periodic pumping to remove the solids, fats, oils, and grease that accumulate in the septic tank?

A. Activated sludge-based unit(s) D. Effective wastewater management

B. O&M maintenance activitie(s) E. Staking of system components

C. Conventional systems F. None of the Above

**Enhanced Treatment Systems**

132. Which of the following terms have proven to be effective in situations where conventional systems are not appropriate?

A. Treatment performance D. Wastewater treatment system(s)

B. Cluster system(s) E. Wastewater alternative technologie(s)

C. Several wastewater alternative technologies F. None of the Above

**Material Replacement**

133. Technologies that replace one component of the conventional system with a component manufactured from?

A. Clustered system(s) D. Advanced or innovative technologies

B. Conventional system(s) E. Wastewater alternative technologie(s)

C. O&M requirement(s) F. None of the Above

**Enhanced Wastewater Treatment**

134. Advanced or innovative technologies that provide a \_\_\_\_\_\_\_\_\_\_\_\_\_beyond conventional systems. Generally, these systems have mechanical or moving parts that require periodic operation and maintenance, inspections, and eventual replacement.

A. Clustered system(s) D. Higher level of treatment

B. Conventional system(s) E. Wastewater alternative technologie(s)

C. O&M requirement(s) F. None of the Above

135. Enhanced wastewater treatment systems are more complex than \_\_\_\_\_\_\_\_\_\_\_\_and require greater oversight to keep all aspects of the treatment process in balance.

A. Treatment performance D. Conventional systems

B. Cluster system(s) E. Wastewater alternative technologie(s)

C. O&M requirement(s) F. None of the Above

**Clustered Treatment Systems**

136. Which of the following terms can serve from two to 200 or more homes and/or commercial facilities?

A. Clustered system(s) D. Advanced or innovative technologies

B. Conventional system(s) E. Wastewater alternative technologie(s)

C. O&M requirement(s) F. None of the Above

137. Which of the following terms have become an attractive option for many locations, especially in areas like small lakeside communities where a higher level of treatment may be needed?

A. Treatment performance D. Enhanced wastewater treatment system(s)

B. Cluster system(s) E. Wastewater alternative technologie(s)

C. O&M requirement(s) F. None of the Above

138. Various technologies that can be implemented via a?

A. Clustered system(s) D. Advanced or innovative technologies

B. Conventional system(s) E. Wastewater alternative technologie(s)

C. O&M requirement(s) F. None of the Above

**Management Considerations**

139. In the past, state and local wastewater management programs rarely specified O&M requirements for?

A. Treatment performance D. Enhanced wastewater treatment system(s)

B. Cluster system(s) E. Conventional or enhanced wastewater systems

C. O&M requirement(s) F. None of the Above

140. As more and more systems malfunction and threaten waterways and as more systems include higher maintenance electrical and mechanical components, communities are recognizing the value of?

A. Clustered system(s) D. Advanced or innovative technologies

B. Conventional system(s) E. Private property

C. O&M requirement(s) F. None of the Above

141. Many are strengthening programs with a number of tools, including requirements for homeowner service contracts, routine maintenance inspections, revocable operating permits, monitoring, and enhanced reporting and data management that support proper?

A. Treatment performance D. Enhanced wastewater treatment system(s)

B. System performance E. Wastewater alternative technologie(s)

C. O&M requirement(s) F. None of the Above

**Maintenance Inspections**

142. Maintenance inspections are gaining appeal as a management tool to assess the condition of systems and determine pumping or?

A. Other O&M needs D. Alternative and enhanced wastewater technologies

B. Septic tank pumping E. Operation and maintenance inspection programs

C. Advances in technology F. None of the Above

143. Some local agencies have adopted a sewage management program that requires the annual inspection of systems with newly issued or modified permits and proof of \_\_\_\_\_\_\_\_\_\_\_ for all systems (old and new).

A. O&M needs D. Alternative and enhanced wastewater technologies

B. Septic tank pumping E. Operation and maintenance inspection programs

C. Advances in technology F. None of the Above

144. Which of the following terms are usually coupled with a mandatory septic tank pumping program?

A. O&M needs D. Alternative and enhanced wastewater technologies

B. Septic tank pumping E. Operation and maintenance inspection programs

C. Advances in technology F. None of the Above

145. Typical pumping requirements vary from three to five years or more based on the \_\_\_\_\_\_\_\_\_\_\_\_and individual household wastewater characteristics.

A. Service provider(s) D. Performance-based system

B. Typical pumping requirement(s) E. Daily sewage flow

C. Enhanced system(s) F. None of the Above

146. Alternative and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_require additional maintenance and/or ongoing attention.

A. O&M needs D. Enhanced wastewater technologies

B. Septic tank pumping E. Operation and maintenance inspection programs

C. Advances in technology F. None of the Above

**Maintenance of Systems**

147. Enhanced systems may also require an increased frequency of inspections to determine if they are performing as required. These systems are \_\_\_\_\_\_\_\_\_and require an annual operating permit, maintenance contract, and annual inspection from the county health department.

A. Service provider(s) D. Performance-based treatment systems

B. Typical pumping requirement(s) E. Final inspection

C. Enhanced system(s) F. None of the Above

148. A key part of \_\_\_\_\_\_\_\_\_\_\_is to track the maintenance of systems. The only way to ensure that maintenance contracts are kept in effect and that systems are monitored when required is for the management entity or regulatory authority to have a structured reporting program.

A. An O&M program D. Alternative and enhanced wastewater technologies

B. Septic tank pumping E. Operation and maintenance inspection programs

C. Advances in technology F. None of the Above

149. Service providers should report maintenance events and any lapses in maintenance contracts to the management or regulatory authority. This information should be managed in a database to monitor \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and provide a system of accountability.

A. Service provider(s) D. Performance-based system

B. Typical pumping requirement(s) E. O&M activities

C. Enhanced system(s) F. None of the Above

**Operating Permits**

150. More complex (enhanced) systems, however, often include\_\_\_\_\_\_\_\_\_\_\_\_\_, maintenance contracts, and compliance measures.

A. Service provider(s) D. Performance-based system

B. Typical pumping requirement(s) E. Maintenance inspections

C. Enhanced system(s) F. None of the Above

**OSSF Maintenance**

151. Which of the following terms can add years to an older system? Even well-designed and properly installed septic systems can fail earlier than expected if previous homeowners did not perform routine maintenance.

A. Proper maintenance D. Septic tank or ATU

B. Necessary pumping frequency E. Pressure manifold(s)

C. An advanced OWTS F. None of the Above

152. Keep in mind the necessary pumping frequency depends on the size of the household and the size of the?

A. Sand/media filter(s) D. Onsite system

B. Septic tank or ATU E. Size of the household and the size of the tank

C. Tank F. None of the Above

153. For example, a four-bedroom home with a 1,250-gallon tank should be pumped approximately every 2.6 years. Modern conveniences such as garbage disposals, hot tubs, or whirlpools will increase the?

A. Proper maintenance D. Septic tank or ATU

B. Necessary pumping frequency E. Pressure manifold(s)

C. An advanced OWTS F. None of the Above

**Permit**

154. Several factors should be considered when choosing the type of onsite system for a site including: soil/site limitations, available space, operation and maintenance requirements, initial costs as well as\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, landscape disturbance, and the owners' preferences and ability to manage the system.

A. Sand/media filter(s) D. Onsite system

B. Septic tank or ATU E. O & M costs

C. Sewage tank F. None of the Above

155. Of these considerations, often the most limiting is the \_\_\_\_\_\_\_\_\_\_\_or site and space limitations.

A. Proper maintenance D. Septic tank or ATU

B. Necessary pumping frequency E. Pressure manifold(s)

C. Soil resource F. None of the Above

**Aerobic Treatment Units (ATUs)**

156. In Missouri, the minimum construction standards require that \_\_\_\_\_\_\_\_\_\_comply with NSF Standard 40.

A. Sand/media filter(s) D. Onsite system

B. ATUs E. Size of the household and the size of the tank

C. Sewage tank F. None of the Above

**Gravity Effluent Distribution Devices**

157. Divide and/or transport the liquid effluent from a \_\_\_\_\_\_\_\_\_\_\_\_ to absorption trenches for dispersal into the soil. These devices include distribution boxes, drop boxes, and step-downs.

A. Proper maintenance D. Septic tank or ATU

B. Necessary pumping frequency E. Pressure manifold(s)

C. OWTS F. None of the Above

**Gravity Laterals**

158. A system of trenches excavated along ground contours used to distribute effluent by gravity flow from a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and apply the effluent to the soil infiltrative surface.

A. Sand/media filter(s) D. Onsite system

B. Septic tank or ATU E. Size of the household and the size of the tank

C. Sewage tank F. None of the Above

**Dosed Gravity Systems**

159. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be used to more equally divide effluent between gravity lateral trenches or to proportion effluent to unequal length trenches; however, effluent is still moved along the length of a trench by gravity.

A. Proper maintenance D. Septic tank or ATU

B. Necessary pumping frequency E. Pressure manifold(s)

C. An advanced OWTS F. None of the Above

**Advanced Onsite Wastewater Treatment Systems and components include**:

**Sand filters**

160. A packed-bed filter of sand or other granular materials used to provide advanced secondary treatment of septic tank effluent. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ consist of a lined excavation or structure filled with uniform washed sand that is placed over an under-drain system.

A. Sand/media filter(s) D. Onsite system

B. Septic tank or ATU E. Size of the household and the size of the tank

C. Sewage tank F. None of the Above

161. The wastewater is dosed onto the surface of the sand through a \_\_\_\_\_\_\_\_\_\_\_\_and allowed to percolate through the sand to the under-drain system, which collects the filter effluent for further processing or discharge.

A. Proper maintenance D. Distribution network

B. Necessary pumping frequency E. Pressure manifold(s)

C. An advanced OWTS F. None of the Above

**Other Media Bio-filters**

162. Which of the following terms using other more porous materials, to provide advanced secondary treatment of septic tank effluent?

A. Packed-bed filter(s) D. An above ground treatment system

B. Engineered distribution system(s) E. A subsurface soil dispersal system

C. An OWTS F. None of the Above

**Constructed Wetlands**

163. An OWTS that incorporates \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ consisting of one or more lined basins which may be filled with a medium and where wastewater undergoes some combination of physical, chemical, and/or biological treatment and evapotranspiration.

A. Packed-bed filter(s) D. An above ground treatment system

B. Engineered distribution system(s) E. A subsurface soil dispersal system

C. An OWTS F. None of the Above

**Sand Mounds**

164. Which of the following terms that incorporates at least 12 inches of clean sand above the original soil surface and disperses the treated wastewater into the original soil?

A. Packed-bed filter(s) D. An above ground treatment system

B. Engineered distribution system(s) E. A subsurface soil dispersal system

C. An OWTS F. None of the Above

**Low-pressure Distribution Systems**

165. An OWTS in which pressurized small diameter distribution lines are used for equal distribution of effluent within the final treatment and?

A. Packed-bed filter(s) D. An above ground treatment system

B. Engineered distribution system(s) E. A subsurface soil dispersal system

C. Dispersal component F. None of the Above

**Drip Irrigation Systems**

166. Which of the following terms that distributes treated wastewater through drip irrigations lines?

A. Packed-bed filter(s) D. An above ground treatment system

B. Engineered distribution system(s) E. A subsurface soil dispersal system

C. An OWTS F. None of the Above

**Suitable Soil**

167. One tablespoon of soil can contain over one million microscopic organisms, including bacteria, protozoa, fungi, molds, and?

A. Effluent D. Some organic material and total suspended solids (TSS)

B. Soil microorganism(s) E. Suitable soil

C. Soil condition(s) F. None of the Above

168. The bacteria and other microorganisms in the soil treat the wastewater and purify it before it reaches groundwater. However, the wastewater must pass through the \_\_\_\_\_\_\_\_\_\_\_slowly enough to provide adequate contact time with microorganisms.

A. Effluent D. Some organic material and total suspended solids (TSS)

B. Soil microorganism(s) E. Soil

C. Soil condition(s) F. None of the Above

169. Which of the following terms in soil treat wastewater physically, chemically, and biologically before it reaches the groundwater, preventing pollution and public health hazards?

A. Complex biological community D. Pathogenic bacteria

B. Microorganism(s) E. TSS and organic material

C. Microbial slime(s) F. None of the Above

170. Under some soil conditions, \_\_\_\_\_\_\_\_\_\_may not accept the wastewater or may fail to properly treat the wastewater unless special modifications to system design are made.

A. Effluent D. Some organic material and total suspended solids (TSS)

B. Soil microorganism(s) E. Subsurface absorption systems

C. Soil condition(s) F. None of the Above

171. Public health is a major concern because domestic wastewaters contain many substances that are undesirable and potentially harmful, such as pathogenic bacteria, \_\_\_\_\_\_\_\_\_\_\_, organic matter, toxic chemicals, pharmaceutical drugs, and excess nutrients.

A. Complex biological community D. Infectious viruses

B. Microorganism(s) E. TSS and organic material

C. Microbial slime(s) F. None of the Above

172. Which of the following terms need the same basic conditions as humans do to live and grow: a place to live, food to eat, water, oxygen to breathe, suitable temperatures, and time to grow?

A. Effluent D. Some organic material and total suspended solids (TSS)

B. Soil microorganism(s) E. Suitable soil

C. Soil condition(s) F. None of the Above

173. Soil microorganisms attach themselves to soil particles using microbial slimes and use the oxygen and water that are present in the?

A. Complex biological community D. Soil pores

B. Microorganism(s) E. TSS and organic material

C. Microbial slime(s) F. None of the Above

174. The first component in an individual sewage treatment system is usually a septic tank, which removes some organic material and?

A. Effluent D. Total suspended solids (TSS)

B. Soil microorganism(s) E. Suitable soil

C. Soil condition(s) F. None of the Above

175. Which of the following terms removal is very important because it prevents excessive clogging of the soil infiltrative surface?

A. Complex biological community D. Pathogenic bacteria

B. Microorganism(s) E. TSS and organic material

C. Microbial slime(s) F. None of the Above

**Suitably-textured Soil**

176. Which of the following terms must be deep enough to allow adequate filtration and treatment of the effluent before it is released into the natural environment?

A. Effluent D. Suitably-textured soil

B. Soil microorganism(s) E. Suitable soil

C. Soil condition(s) F. None of the Above

177. Usually this release is into groundwater. It has been determined that three feet of aerated soil will provide sufficient treatment of?

A. Complex biological community D. Septic tank effluent

B. Microorganism(s) E. TSS and organic material

C. Microbial slime(s) F. None of the Above

178. This three-foot treatment zone provides sufficient detention time for final bacteria breakdown and sufficient distance for the filtration that is essential for the safe treatment of ?

A. Effluent D. Effluent BOD

B. Soil microorganism(s) E. Suitable soil

C. Soil condition(s) F. None of the Above

**Impacts of Effluent on Groundwater**

179. Which of the following terms is overloaded with a treatable contaminant, or when the contaminant cannot be treated by the soil, the quality of the underlying groundwater may change significantly?

A. Wastewater D. Soil treatment trench

B. Distribution media E. Dispersal zone

C. Biomat F. None of the Above

180. When a septic system fails to effectively treat and disperse \_\_\_\_\_\_\_\_\_, it can become a source of pollution. This type of failure can occur in three different ways.

A. Pollution of groundwater D. Soil treatment and dispersal zone

B. Effluent E. Unsaturated flow

C. Anaerobic bacteria F. None of the Above

181. The first way is when effluent ponds on the soil surface, causing a wet seepy area. The second obvious way that \_\_\_\_\_\_\_\_\_\_\_\_can fail is to have effluent backing up into the dwelling.

A. Septic system D. Soil treatment trench

B. Distribution media E. Dispersal zone

C. Biomat F. None of the Above

182. Pollution of groundwater is very difficult to clean up, since the only access to the water table is through wells, trenches, or?

A. Pollution of groundwater D. Soil treatment and dispersal zone

B. Effluent E. Unsaturated flow

C. Anaerobic bacteria F. None of the Above

**Soil Treatment Processes**

183. The soil treatment and \_\_\_\_\_\_\_\_\_\_\_\_ provides for the final treatment and dispersal of septic tank effluent.

A. Wastewater D. Soil treatment trench

B. Distribution media E. Dispersal zone

C. Biomat F. None of the Above

184. To varying degrees, the \_\_\_\_\_\_\_\_\_ and dispersal zone treats the wastewater by acting as a filter, exchanger, or absorber by providing a surface area on which many chemical and biochemical processes occur.

A. Pollution of groundwater D. Soil treatment

B. Effluent E. Unsaturated flow

C. Anaerobic bacteria F. None of the Above

**Biomat**

185. As septic tank effluent flows into a soil treatment trench, it moves vertically through the distribution media to the \_\_\_\_\_\_\_\_\_\_ where treatment begins.

A. Wastewater D. Soil treatment trench

B. Distribution media E. Dispersal zone

C. Biomat F. None of the Above

186. The biomat is a biological layer formed by \_\_\_\_\_\_\_\_, which secrete a sticky substance and anchor themselves to the soil, rock particles, or other available surfaces.

A. Pollution of groundwater D. Soil treatment and dispersal zone

B. Effluent E. Unsaturated flow

C. Anaerobic bacteria F. None of the Above

187. When fully developed, the gray-to-black sticky \_\_\_\_\_\_\_\_layer is about one inch thick.

A. Wastewater D. Soil treatment trench

B. Distribution media E. Dispersal zone

C. Biomat F. None of the Above

188. Unsaturated flow increases the travel time of effluent through the soil, ensuring that it has sufficient time to contact the surfaces of soil particles and?

A. Pollution of groundwater D. Soil treatment and dispersal zone

B. Effluent E. Microorganisms

C. Anaerobic bacteria F. None of the Above

189. A properly functioning \_\_\_\_\_\_\_\_will have wastewater ponded in the distribution media while the soil a few inches outside of and below the distribution media will be unsaturated.

A. Gravity-fed system D. Soil treatment trench

B. Distribution media E. Dispersal zone

C. Biomat F. None of the Above

190. Unsaturated soil has pores containing both air and water so aerobic microorganisms living in the soil can effectively treat the wastewater as it travels through the?

A. Pollution of groundwater D. Soil treatment and dispersal zone

B. Effluent E. Soil system

C. Anaerobic bacteria F. None of the Above

191. In unsaturated soil under a biomat, water movement is restricted. In order for the wastewater to move through the soil, it must be pulled or wicked through the fine pores by ?

A. Aerobic bacteria D. Aerobic

B. Clustered wastewater system(s) E. Anaerobic

C. Equilibrium F. None of the Above

**Sewage Treatment Utilizing Soil**

192. A developed biomat reaches \_\_\_\_\_\_\_\_\_\_\_\_\_\_ over time, remaining at about the same thickness and the same permeability if effluent quality is maintained.

A. Final treatment of effluent D. Upstream processes in the treatment train

B. Wastewater flow/strength E. Anaerobic microorganism(s)

C. Quality of the effluent F. None of the Above

193. On the soil side of the biomat beneath the drainfield, oxygen is present so that conditions are allowing aerobic soil bacteria to feed on and continuously break down the?

A. Aerobic bacteria D. Biomat

B. Clustered wastewater system(s) E. Anaerobic

C. Equilibrium F. None of the Above

194. Which of the following terms leaving the septic tank decreases because of failure to regularly pump out the septic tank, more food will be present for the anaerobic bacteria, which will cause an increase in the thickness of the biomat and decrease its permeability?

A. Final treatment of effluent D. Upstream processes in the treatment train

B. Wastewater flow/strength E. If the quality of the effluent

C. Quality of the effluent F. None of the Above

195. If seasonally saturated conditions occur in the soil outside the trench, aerobic conditions will no longer exist, which will prevent \_\_\_\_\_\_\_\_\_from breaking down the biomat.

A. Aerobic bacteria D. Aerobic

B. Clustered wastewater system(s) E. Anaerobic

C. Equilibrium F. None of the Above

**Site Evaluations**

196. The success of any soil-discharging wastewater treatment system depends on the appropriate match between\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the treatment system design, and the site that receives effluent from the system.

A. Final treatment of effluent D. Upstream processes in the treatment train

B. Wastewater flow/strength E. Wastewater flow/strength

C. Quality of the effluent F. None of the Above

197. Which of the following terms observations and characterization by a qualified, experienced professional is essential to understanding local site conditions and ensuring the proper operation of individual and clustered wastewater systems?

A. Aerobic bacteria D. Site-specific

B. Clustered wastewater system(s) E. Anaerobic

C. Equilibrium F. None of the Above

**Assure System Performance**

198. Wastewater systems depend on the soil for 1) final treatment of effluent from the tank or unit process components, and 2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

A. Final treatment of effluent D. Upstream processes in the treatment train

B. Dispersal of the effluent to the soil E. Anaerobic microorganism(s)

C. Quality of the effluent F. None of the Above

199. The subsurface “ponding” and slow release of effluent to the soil through the biomat facilitates treatment via chemical, physical, and biological processes such as\_\_\_\_\_\_\_\_, adsorption of potential pollutants (e.g., phosphorus), filtration of solids, and decomposition of organic constituents.

A. Aerobic bacteria D. Upstream processes in the treatment train

B. Clustered wastewater system(s) E. Aerobic nitrification of ammonia

C. Equilibrium F. None of the Above

200. Predicting the \_\_\_\_\_\_\_\_\_\_\_\_and overall treatment efficacy of the soil component of the system requires a fairly comprehensive understanding of how these processes work, how they are enhanced or impeded, and how the upstream processes in the treatment train can be adjusted or adapted to ensure that the soil can handle the flow and pollutant load delivered.

A. Final treatment of effluent D. Pollutant removal

B. Wastewater flow/strength E. Anaerobic microorganism(s)

C. Quality of the effluent F. None of the Above