

CLEAR CREEK COUNTY Public and Environmental Health	Site Characterization and Design Requirements	Section 13
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1. Site and Soil Evaluation

- A. A site and soil evaluation shall be conducted for each property on which an OWTS is proposed, to determine the suitability of a location to support an OWTS, and to provide the design engineer a sound basis to select the most appropriate OWTS design for the location and application.

- B. Each site evaluation shall consist of:
 - 1. Preliminary investigation;
 - 2. Reconnaissance;
 - 3. Detailed soil investigation; and
 - 4. Report and site plan.

2. Preliminary Investigation

- A. A preliminary investigation shall review documented information relative to the site and anticipated conditions. Information gathered as part of the preliminary investigation shall include, but is not limited to:
 - 1. Property Information:
 - a. Address;
 - b. Legal description;
 - c. Existing structures; and
 - d. Location of existing or proposed wells on the property.
 - 2. Department records;
 - 3. Published site information, including topography and soil data;
 - 4. Location of physical features, on and off the property that will require setbacks as identified in Table A-1 of Appendix A, if applicable;

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5. Preliminary soil treatment area size estimate based on information on existing or planned facility and these Regulations;
6. Additional information that may be useful to the specific evaluation as available:
 - a. Survey;
 - b. Easements;
 - c. Floodplain maps;
 - d. Geology and basin maps and descriptions;
 - e. Aerial photographs;
 - f. Climate information; and
 - g. Delineated wetlands maps.

3. Reconnaissance Visit

- A. A reconnaissance visit to the property shall evaluate the topography and other surface conditions that will impact the selection and location and design of the OWTS, including:
 1. Landscape position;
 2. Topography;
 3. Vegetation;
 4. Natural and cultural features; and
 5. Current and historic land use.

4. Soil Investigation

- A. Soil investigations to determine the long-term acceptance rate of a soil treatment area shall be either:
 1. Visual and tactile evaluation of two or more soil profile test pit excavations; or
 2. Percolation tests plus one or more soil profile holes or one or more soil profile test pit excavations.

5. Soil Profile Test Pits

- A. If percolation tests are performed, at least one (1) soil profile hole shall be evaluated to determine whether current ground water levels and/or bedrock is encountered within eight (8) feet of the ground surface. A visual and tactile evaluation of a soil profile test pit excavation as described in Section 13.7 may be substituted for a profile hole. Following three (3) years after the effective date of Regulation 43, a visual and tactile evaluation of a soil profile test pit excavation shall be used instead of a soil profile hole when percolation tests are performed to determine long-term acceptance rates.
- B. If visual and tactile evaluations of soil are performed without percolation tests to determine long-term acceptance rate:
 - 1. Evaluation of two (2) or more soil profile test pit excavations shall be performed to determine soil types and structure, restrictive layers, evidence of seasonal high ground water, and best depth for the infiltrative surface;
 - 2. At least one (1) of the soil profile test pit excavations shall be performed in the portion of the soil treatment area anticipated to have the most limiting conditions; and
 - 3. The total number of soil profile test pit excavations required is based on the judgment of the competent technician.

6. Percolation Tests

- A. The percolation testing shall be performed by a trained person under the supervision of a professional engineer or by a competent technician as provided in Section 13.13.
- B. Soil percolation tests shall be performed in at least three (3) test holes in the area in which the soil treatment area is to be located, spaced reasonably evenly over the proposed area. There shall be no less than one (1) test hole provided in every 1,200 square foot area of soil treatment area.
- C. If the likely depth of a proposed infiltrative surface is uncertain, percolation tests shall be performed at more than one (1) depth to determine the depth of the infiltrative surface.
- D. The percolation test hole shall have a diameter of 8 to 12 inches and be terminated a minimum of six (6) inches and a maximum of 18 inches below the proposed infiltrative surface.
- E. If a change of soil type, color, or structure is present within those soils comprising the depth of soil below the infiltrative surface as required in Table A-2 of Appendix A for vertical separation, a

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minimum of two (2) soil percolation holes shall be terminated in the changed soil and percolation tests shall be conducted in both holes.

- F. The percolation tests shall be conducted using the hole preparation, soil saturation, and rate measurement procedures described below.

1. Preparation of Percolation Test Holes

- a. Excavate the hole to the depth and diameter required.
- b. Carefully scrape the bottom and sides of the hole with a knife blade or sharp instrument to remove any smeared soil surfaces and provide a natural soil interface into which water may percolate.
- c. Remove all loose soil from the hole.
- d. Add two (2) inches of very coarse sand or fine gravel to protect the bottom of the hole from scouring and sediment.

2. Preparation of Percolation Test Holes

- a. The hole shall be presoaked adequately to accomplish both saturation, which is filling the void spaces between the soil particles, and swelling, which is the intrusion of water into the individual soil particles.
- b. To presoak the hole, carefully fill the hole with clean water to a minimum depth of 12 inches over the gravel placed in the bottom of the hole. In most soils, it is necessary to refill the hole by supplying a surplus reservoir of clean water, possibly by means of an automatic siphon, to maintain water in the hole for at least four (4) hours and preferably over night. Determine the percolation rate 24 hours after water is first added to the hole. This procedure is to ensure that the soil is given ample time to swell and to approach the condition it will be in during the wettest season of the year. In sandy soils containing five (5) percent or less particles passing the #200 sieve, by weight, the swelling procedure is not essential and the test may be conducted after the water from one (1) filling of the hole has completely seeped out of the hole.

3. Percolation Rate Measurement

- a. With the exception of sandy soils containing five (5) percent or less particles passing the #200 sieve, by weight, percolation rate measurements shall be made on the day following the presoak procedure.

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- b. If water remains in the percolation test hole after the swelling period, adjust the depth to approximately six (6) inches above the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level over a series of 30 minute intervals. The drops are used to calculate the percolation rate.
 - c. If no water remains in the hole after the swelling period, carefully add clean water to bring the depth of water in the hole to approximately six (6) inches above the top of the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level at 30 minute intervals for four (4) hours, refilling to six (6) inches over the top of the gravel as necessary. The drop in water level that occurs during the final 30-minute period is used to calculate the percolation rate. If the water level drops during prior periods provide sufficient information, the procedure may be modified to suit local circumstances. The requirement to conduct a four (4) hour test under this section is waived if three (3) successive water-level drops do not vary by more than 1/16 inch; however, in no case shall a test under this section be less than two (2) hours in duration.
4. Special Requirements for Sandy and Special Soils
 - a. In sandy soils or other soils in which the first six (6) inches of water seeps out of the hole in less than 30 minutes, after the 24 hours swelling period, the time interval between measurements shall be taken as ten (10) minutes and the test conducted for one (1) hour. The drop that occurs during the final ten (10) minutes shall be used to calculate the percolation rate.
 - b. If the soil is so sandy or coarse-textured that it will not retain any water, then the infiltration rate shall be recorded as less than one (1) minute per inch.
 - c. The Department may identify soil types in its area, for which it shall require different procedures such as extra presoaking to obtain a valid percolation rate.
5. Percolation Rate Determination and Reporting
 - a. The field percolation rate shall be the average rate of the percolation rates determined for all percolation test holes observed in the proposed soil treatment area in minutes per inch. The average percolation rate determined by the tests shall be used in determining the LTAR for the proposed system from Appendix C.
 - b. The technician performing the percolation tests shall furnish an accurate scale drawing, showing the location of the soil profile holes or soil profile test pit excavations and percolation holes tied to lot corners or other permanent objects. The drawing shall meet the criteria in Section 13.11. The information in Section 13.11.C.6 through 13.11C.10 may be included but is not required for this drawing. All holes shall be

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clearly labeled to relate to the information provided for the profile test pits and percolation tests.

6. Percolation Test Waiver

- a. If the applicant demonstrates to the satisfaction of the health officer that the system is not dependent upon soil absorption, the requirement of percolation tests may be waived.

7. Alternate Percolation Testing

- a. Alternate percolation test procedures may be approved, provided the test results of alternate procedures are substantially equivalent to those determined using the test procedures described in this section.
- b. Prior approval from the health officer of alternate percolation test procedures is required.

7. Visual and Tactile Evaluation of Soil Requirements

- A. Each soil profile test pit excavation observed at the proposed soil treatment area shall be evaluated under adequate light conditions with the soil in an unfrozen state.
- B. The soil observations shall be conducted at or immediately adjacent to the location of the proposed soil treatment area, but if possible, not under the final location of a trench or bed.
- C. The soil observation method shall allow observation of the different soil horizons that constitute the soil profile.
- D. Soil profile test pit observations shall be conducted prior to percolation tests to determine whether the soils are suitable to warrant percolation tests and, if suitable, at what depth percolation tests shall be conducted.
- E. The minimum depth of the soil profile test pit excavation shall be to the periodically saturated layer, to the bedrock, or four (4) feet below the proposed depth of the infiltrative surface, whichever is encountered first.
- F. The soil type at the proposed infiltrative surface of the soil treatment area or a more restrictive soil type within the treatment depth shall be used to determine the LTAR from Appendix C. The treatment depth is two (2) to four (4) feet depending on the required thickness for the treatment level below the infiltrative surface from Table A-2 of Appendix A.

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- G. Soils data, previously collected by others at the site can be used for the purposes of an OWTS design at the discretion of the health officer. Previous soils data shall be verified, at a minimum, by performing an evaluation of a soil profile test pit excavation.

8. Determination of a Limiting Layer

- A. Soil descriptions for determination of a limiting layer shall include:
 - 1. The depth of each soil horizon measured from the ground surface and a description of the soil texture, structure, and consistency of each soil horizon;
 - 2. Depth to the bedrock;
 - 3. Depth to the periodically saturated soil as determined by:
 - a. Redoximorphic features and other indicators of water levels, or
 - b. Depth of standing water in the soil observation excavation, measured from the ground surface, if observed, unless redoximorphic features indicate a higher level.
 - 4. Any other soil characteristic that needs to be described to design a system, such as layers that will restrict permeability.

9. Percolation Hole and Profile Test Pit Marking

- A. The engineer or technician conducting the percolation tests shall, upon completion of the tests, flag or otherwise mark each hole or pit to allow easy location by others. Percolation holes and profile test pits shall remain open until after evaluation by the health officer unless otherwise approved. Excavations shall be suitably protected to prevent access by unauthorized persons.

10. Report and Site Plan

- A. A written report shall describe the results of the preliminary investigation, reconnaissance, and detailed evaluations. The report may be in text and/or tabular form and shall include a drawing locating features relative to the proposed OWTS location and test locations. The report may be included as part of the OWTS design document. The report shall include, but is not limited to:
 - 1. The name, address, telephone number, e-mail address, credentials, and qualifications of the individual conducting the site evaluation;
 - 2. Preliminary and detailed evaluations, providing information from the surface site characteristics assessment and soils investigation;
 - 3. Dates of preliminary and detailed evaluations;

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4. A graphic soil log, to scale, indicating depth of drill hole or excavation, soil description and classification, depth to ground water encountered during drilling or excavation, type of equipment used to drill the profile hole or excavate the soil profile test pit, date of soils investigation, name of investigator, and company name;
5. Setback distances to features listed in both tables of Appendix A, existing on the site or within applicable setback limits, whichever is greater; and
6. A drawing created to a scale that provides the complete property boundary lines. Minimum drawing size shall be 8.5 by 11 inches and maximum of 11 by 17 inches. If the property is too large to adequately indicate and label the profile test pits and percolation test holes, a detail of the portion of the site containing the soil profile test pits and percolation test holes shall be submitted. If the property is too large to adequately show site evaluation information, a detail drawing that includes the information required from the site and soil evaluation that will impact the location of the OWTS shall be submitted. Drawings shall indicate dimensions, have a north arrow, and graphic scale and include:
 - a. Horizontal and vertical reference points of the proposed soil treatment area; soil observations; percolation testing results and pertinent distances from the proposed OWTS to all required setbacks, lot improvements, easements; ordinary high water mark of a pond, creek, stream, lake, wetland, or other surface waters and detention or retention ponds; and property lines;
 - b. Contours or slope direction and percent slope;
 - c. The location of any visible or known unsuitable, disturbed, or compacted soils;
 - d. The estimated depth of periodically saturated soils and bedrock or flood elevation, if applicable; and
 - e. The proposed elevation of the infiltrative surface of the soil treatment area, from an established datum (either ground surface or a benchmark).
7. Anticipated construction-related issues;
8. An assessment of how known or reasonably foreseeable land use changes are expected to affect the system performance, including, but not limited to, changes in drainage patterns, increased impervious surfaces, and proximity of new water supply wells; and

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9. A narrative explaining difficulties encountered during the site evaluation, including but not limited to identifying and interpreting soil and landform features and how the difficulties were resolved.

11. Design Document

- A. The report and site plan may be attached to the design document or the report and site plan may be combined with the design information as a single document.
- B. The design document shall include a brief description of the facility and its proposed use, basis and calculations of design flow and influent strength.
- C. The design document shall contain all plan detail necessary for permitting, installation, and maintenance, including:
 1. Assumptions and calculations for each component;
 2. A scale drawing showing location of each OWTS component and distances to water, physical and health impact features requiring setbacks as set forth in Table A-1 of Appendix A, including all wells less than 200 feet from the proposed STA;
 3. Layout of soil treatment area, dimensions of trenches or beds, distribution method and equipment, distribution boxes, drop boxes, valves, or other components used;
 4. Depth of infiltrative surface of soil treatment area, depth of the septic tank, depth of other components;
 5. Specifications of each component, a design for the wastewater pumping system, if applicable;
 6. Specifications for septic tanks or other buried components shall include loads due to burial depth, additional weight or pressure loads, and highest elevation of ground water. Resistance to local water composition such as high sulfates shall be included in the specification if such conditions exist at the site;
 7. References to design manuals or other technical materials used;
 8. Installation procedures;
 9. Operation and maintenance manuals or instructions; and
 10. Other information that may be useful such as photos and cross-section drawings.

12. Site Protection

- A. During construction, the proposed soil treatment area and replacement area, if any, shall be protected from disturbance, compaction, or other damage by staking, fencing, posting, or other effective method.

13. Qualifications for a Competent Technician

- A. Technicians performing percolation tests shall have the following competencies:
 - 1. Set up equipment;
 - 2. Perform and run percolation tests according to the procedure in these Regulations; and
 - 3. Record results and calculate percolation rates.
- B. The health officer may approve training for percolation testing.
- C. Technicians performing visual and tactile evaluation of soil shall have the following competencies:
 - 1. Identify soil types by hand texturing and observation;
 - 2. Identify presence or absence of soil structure;
 - 3. Identify grade of soil structure;
 - 4. Recognize evidence of highest seasonal water surface;
 - 5. Identify layers and interfaces that will interfere with effluent movement;
 - 6. Determine the most promising depth for infiltrative surface of OWTS and for percolation tests, if used; and
 - 7. Understand basic principles of OWTS siting and design.
- D. Possible demonstrations of competence in visual and tactile evaluation of soil:
 - 1. Degree in soil science, agronomy, geology, other majors if a course(s) in soil morphology was included; or
 - 2. Attendance at training or workshop for soil evaluation for OWTS including both class and field work.

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- E. The Division shall approve training for visual and tactile evaluation of soil.