# Bureau of Water Pollution Control

# SOIL EVALUATIONS FOR ON-SITE SEWAGE DISPOSAL SYSTEMS

# WTS-25

# Ver.1 March 2023

a. Introduction:

In accordance with NAC 445A.961, an Engineering Report to construct, alter or expand an On-Site Sewage Disposal System (OSDS) must include data from a percolation test, unless an alternative investigation of soil characteristics pursuant to NAC 445A.967 is used. If an alternative investigation of soil characteristics is performed, the results of that investigation must be included in the soil analysis. This guidance document provides suggested, supporting data from an onsite soil survey (evaluation) to be prepared under the supervision of a qualified person, including without limitation, a design engineer, soils scientist, or a geologist, approved by the Division or other administrative authority. In lieu of a percolation test, the Division requires the submission of a minimum of one soil survey (evaluation) per each proposed effluent absorption system.

Fig. 1 – Orovada Series Profile – Nevada's State Soil (Soil Science Society of America)

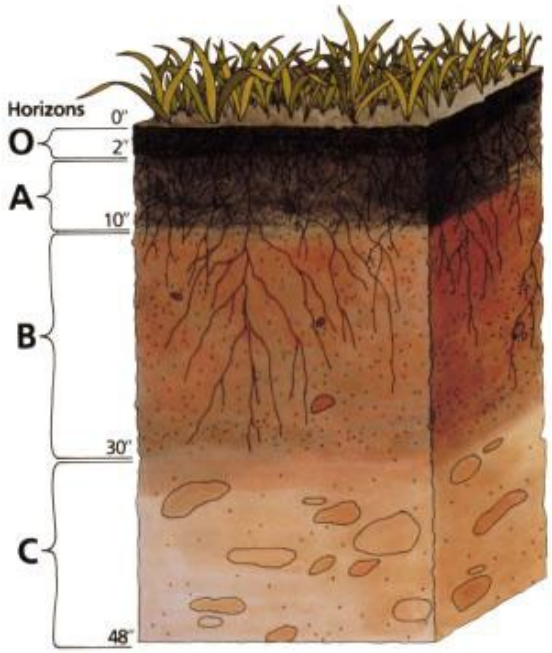


Fig. 2 – Soil Horizons (NRCS-USDA)

b. Soil Loading Rate:

The soil survey (evaluation) analysis provides a recommended soil loading or Long-Term Acceptance Rate (LTAR) to size the soil absorption system (refer to NAC 445A.9674 or other published data – see below).

**Table 1 – Soil Loading Rates**

| Soil Texture | LTAR (gpd/ft$^2$) | Equiv. Percolation Rate (min./in.) |
|---|---|---|
| Gravel to Coarse Sand | See NAC 445A.9666 | Less than 1 |
| Coarse to Medium Sand | See NAC 445A.9666 | 1 – 5 |
| Fine Sand to Loamy Sand | 1.1 | 6 – 10 |
| Sandy Loam to Loam | 1.0 | 11 – 20 |
| Loam | 0.7 | 21 – 30 |
| Loam to Silty Loam | 0.5 | 31 – 40 |
| Silty Clay Loam to Clay Loam | 0.4 | 41 – 60 |
| Clay Loam to Clay | 0.2 | 61 - 120 |
| Clay to Rock | Not recommended | Greater than 120 |

c. References:

i. *Nevada Administrative Code (NAC) Water Controls: NAC 445A.950 through NAC 445A.9706, inclusive*.

ii. *Onsite Wastewater Disposal*, Perkins, 1st ed. (1989).

iii. *Onsite Wastewater Treatment Systems*, Burks & Minnis, 1st ed. (1994).

iv. *Soils and the Environment: A Guide to Soil Surveys and their Applications, Olson, 1st ed. (1981)*.

v. *Soil and Site Evaluation Handbook*, WI Dept. of Safety & Prof. Serv., (2021).

vi. *Soils Science and Management, Plaster, 4th ed. (2003)*.

vii. *USDA Field Book for Describing and Sampling Soils*, v. 3.0 (2012, reprint 2021).

viii. *USDA Soil Survey Manual*, Handbook no. 18 (2017).

ix. *U.S. EPA Design Manual (EPA 625/1-80-012): Onsite Wastewater Treatment and Disposal Systems* (1980).

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

**Soil Evaluation Report Legend** **NDEP Bureau of Water Pollution Control**

1. General: The methodology and terms discussed below for conducting a soil and site evaluation is discussed in further detail in publications including USDA's *Field Book for Describing and Sampling Soils* and *Soil Survey Manual*.
2. Horizon: From top to bottom, identify each master horizon and layer using capital letters, suffixes, and other modifiers (numerical prefixes or suffixes and prime or caret symbols).
3. Depth: Record the depth (inches) of the upper and lower boundaries of each horizon or layer.
4. Color: Using a standard color reference system (e.g., *Munsell Color Charts*), describe each horizon's dominant color, i.e., Hue, Value, and Chroma. Include the generic (common) soil color.
5. Mottles: Redoximorphic features (soil mottling) resulting from fluctuations in the groundwater table can be described in terms including, Quantity (% of observed surface area), Size (mm), and Contrast (difference between mottles and soil matrix). If mottles are absent, describe as None.
6. Structure: Structural elements (peds) can be described using terminology including Granular (GR), Angular Blocky (ABK), Subangular Blocky (SBK), Lenticular (LP), Platy (PL), Wedge (WEG), Prismatic (PR) or Columnar (COL). Structureless units include Single Grain (SGR) or Massive (MA). Artificial disturbances from tillage or compaction can include Cloddy (CDY). Additional structural qualifiers include Grade (e.g., Structureless, Weak, Moderate or Strong) and Size (e.g., Very Fine, Fine, Medium, Coarse or Very Coarse).
7. Texture: Soil texture is estimated by hand or lab (particle size analysis). The common twelve (12) textural classifications per the Soil Textural Triangle include Sand (S), Loamy Sand (LS), Sandy Loam (SL), Sandy Clay Loam (SCL), Loam (L), Silt Loam (SIL), Silt (SI), Sandy Clay (SC), Clay Loam (CL), Silty Clay Loam (SICL), Silty Clay (SIC) and Clay (C). In all, USDA's *Field Book* lists twenty-one (21) textural classes or subclasses.
8. Roots: The presence or absence of plant roots in each horizon or layer can be described using terminology including, Quantity (% of surface area) and Size (root diameter, mm).
9. Moisture: Soil moisture qualifiers (squeeze test) include, Dry (D), Moist (M) or Wet (W).
10. LTAR: For the soil loading or Long-Term Acceptance Rate (LTAR), refer to NAC 445A.9674, WTS-25 (Table 1) or other published data. The lowest soil loading rate determined by the soils evaluation must be used to determine the required size of the absorption area.
11. Perc Rate: Indicate an equivalent Percolation Rate. Refer to NAC 445A.9674, WTS-25 (Table 1) or other published data.
12. SHWT: Indicate observed or estimated depth to Seasonal High-Water Table (SWHT) in feet and inches below ground surface. Per NAC 445A.9666, the bottom of the absorption system must be at least four (4) feet above the SWHT.
13. Other: Comment as necessary, e.g., soil pH, chemical testing, grain size analysis, etc. Impediments to a conventional septic system and disposal trenches could include steep slope, surface depression (runoff collection), cementation (caliche), shallow depth to groundwater or bedrock, or elevated groundwater nitrate in local supply wells (i.e., nitrogen non-attainment area).
14. Example: See attachment for a sample soil evaluation. A blank form is provided for the report.

NDEP

# SOIL EVALUATION FORM WTS-25

**OSDS Project:** Bunkhouse Septic

**Date Logged:** March 1, 2023.

**Test Pit or Boring No.:** TP-1

**Project Location:** Nye County

**Lat. & Long:** 37.XXXXX, -116.YYYYY

**Method (Pit or Boring):** Test Pit (backhoe)

**Parent Material:** Alluvium (Rhyolite)

**SHWT (ft./in.):** > 200 ft. bgs.

**Restrictive Layer (Y or N):** None

**LTAR (gpd/ft$^2$):** 1.0 gpd/ft$^2$

**Equiv. Perc Rate (min./in.):** 20 min/in

**Field Slope (%):** 2%

**Soil Evaluator:** Joe "Rocky" Geologist

**Signature:** Joe "Rocky" Geologist

**Title or Certification:** Sr. Soil Scientist

| Horizon | Depth | Color | Mottles | Structure | Texture | Roots | Moisture | Other |
|---|---|---|---|---|---|---|---|---|
| A1 | 0 – 5 in. | 10YR 6/3 Pale brown | None | SB/Weak/Med. | Sandy Loam | Many/Med. | Dry | pH 8.4 |
| C1 | 5 – 13 in. | 10YR 6/3 Pale brown | None | SB/Weak/Fine | Sandy Loam | Many/Fine | Dry | pH 8.4 |
| C2 | 13 – 26 in. | 10YR 7/3 Very pale brown | None | Massive/Weak | Loamy Sand | Many/V. Fine | Dry | pH 8.6 |
| C3 | 26 – 60 in. | 10YR 7/3 Very pale brown | None | Massive/Loose | Loamy Sand | Few/V. Fine | Dry | pH 8.6 |



**Additional evaluator comments (as needed):** Land use is open grazing w/15% native plant density (e.g., sage & rabbit brush).

NDEP

# SOIL EVALUATION FORM

WTS-25

**OSDS Project:** _____ **Date Logged:** _____ **Test Pit or Boring No.:** _____

**Project Location:** _____ **Lat. & Long.:** _____ **Method (Pit or Boring):** _____

**Parent Material:** _____ **SHWT (ft./in.):** _____ **Restrictive Layer (Y or N):** _____

**LTAR (gpd/ft$^2$):** _____ **Equiv. Perc Rate (min./in.):** _____ **Field Slope (%):** _____

**Soil Evaluator:** _____ **Signature:** _____ **Title or Certification:** _____

| Horizon | Depth | Color | Mottles | Structure | Texture | Roots | Moisture | Other |
|---|---|---|---|---|---|---|---|---|
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**Additional evaluator comments (as needed):**