



July 24, 2023

Meredith & Martin Woodrow  
31555 Greenridge Drive  
Oak Creek, CO 80467

Job Number: 23-12920

Subject: On-Site Wastewater Treatment  
System Evaluation and Design,  
Woodrow Residence, 31555 Greenridge  
Drive, Routt County, Colorado.

Meredith and Martin,

This report presents the results of an On-site Wastewater Treatment System (OWTS) evaluation and design for your residence at 31555 Greenridge Drive in Routt County, Colorado. This design was completed in accordance with Colorado Department of Public Health and Environment-Water Quality Commission On-site Wastewater Treatment System Regulation #43 (Regulation), as adopted by the Routt County Board of Health. A Subsoil and Foundation Investigation Report (S&FI) was previously completed for the existing residence by NWCC, Inc. (NWCC) under our job number 07-7680, dated September 12, 2007. NWCC previously completed an Onsite Wastewater System Design for the residence under our job number 07-7680 and dated September 4, 2007. NWCC prepared an OWTS Observations report dated March 26, 2008.

**Proposed Construction:** It is our understanding, based on our conversations with you and your contractor, that the residence has a total of 4 bedrooms, and the proposed barn will have a total of 2 bedrooms. The existing OWTS system was originally designed for 3 bedrooms.

**Site Conditions:** The property is located south of Greenridge Drive in Routt County, Colorado. The existing STA is approximately 75 feet from the existing residence and 30 feet from the proposed barn. The vegetation in this area consists of grasses, weeds, ferns, deciduous brush and aspen trees. The topography in the area of the proposed soil treatment area (STA) is variable and generally slopes moderately to strongly down to the southeast on the order of 15 to 20 percent.

The existing 1,000-gallon tank and soil treatment area appeared to be in good condition, with no seepage observed in the STA. Additionally, no standing water was observed in the inspection pipes. The existing STA consists of 43 Quick-4 Standard Infiltrator Chambers, placed in natural topsoil and sands and gravels. It should be noted that a portion of the existing chambers did not appear to have 18-inches of soil cover.

A site plan showing the overall site and approximate locations of the existing features and proposed OWTS is provided in Figure #1. A detailed site plan showing the existing residential structure and proposed OWTS is shown in Figure #2.

**Subsurface Conditions:** One profile pit was excavated in the area of the STA during the investigation May 2007. It should be noted that one additional profile pit must be excavated in the area of the STA prior to construction of the system to confirm subsoil conditions. The subsurface conditions encountered in the test pit consisted of approximately 12 inches of topsoil and organic materials (silty to sandy loam) overlying natural gravels to the maximum depth investigated, 8 feet below the existing ground surface (bgs). The gravels were sandy and silty, non-plastic, medium dense, fine to coarse grained and brown in color.

Percolation testing conducted at the site in 2007, indicates the upper 30 inches feet of natural topsoil and organic materials and sands and gravels exhibited percolation rates ranging from 5 to 30 minutes per inch with an average of 20 mpi. Based on the percolation rate of the near surface soils and visual soil classification of the soils encountered in the profile pits, NWCC would classify the natural topsoil and organics, and sands and gravels as Soil Type 2 in accordance with Table 10-1 of the Regulations.

**OWTS Design:** Based on the soils encountered at the site and our understanding of the proposed construction, NWCC recommends the OWTS design consist of a chamber trench soil treatment system constructed in the upper 12 inches of natural topsoil and organic materials or sands and gravels.

The OWTS design presented below is based on the total anticipated number of bedrooms (6), as well as the percolation rate and classification for the natural soils. Considering the anticipated construction, NWCC has determined, using Table 6-1 of the Regulations, an effluent design flow of 675 gallons per day (gpd) was used in the design of the OWTS.

**Chamber System:** The STA should consist of a trench soil treatment area utilizing Quick-4 Standard Infiltrator or ADS ARC 36 chambers. Based on the soil type, design effluent flow, a Long-Term Acceptance Rate (LTAR) of 0.60 gpd/ft<sup>2</sup> (Treatment Level 1) and size adjustment factors of 1.0 for a gravity trench system (Table 10-2) and 0.7 for chambers (Table 10-3), a minimum trench absorption area of 788 square feet is required for the STA.

Using information provided by Infiltrator System, Inc., an absorption area of 12ft<sup>2</sup>/Quick-4 Standard Infiltrator chamber was used in the design. This results in a minimum of **sixty-six (66)** Quick-4 Standard Infiltrator chambers. The existing system has a total of forty-three (43) chambers; therefore, **twenty-three (23)** additional chambers are required.

If a dosing system is used in the system, the size of the STA can be decreased. NWCC must be consulted to determine the decreased system size and type of septic tank.

The natural soils must be scarified a minimum of 4 inches prior to placement of the chambers. The bases and sides of the chambers must be wrapped with a ¼-inch galvanized or stainless steel, or synthetic mesh to help prevent rodent intrusion. A minimum of 18 inches of soil cover must be placed over the chambers in accordance with the manufacturer's recommendations. A minimum of 18 inches of soil cover must also be placed over the existing chambers. All finished surfaces should have a minimum of 3 inches of topsoil materials and be seeded to prevent erosion. NWCC also recommends the system be fenced off to livestock. If the system is not activated within 30 days of installation or if extended periods of inactivity occur at the

residence, the chambers must be periodically flooded with water, every 30 days, to prevent rodents from nesting and burrowing in the chambers, which could result in a premature failure of the system.

**Septic Tank and Dosing System:** A septic tank with a minimum capacity of 1,750-gallons is required for a six-bedroom residence. Due to the subsurface conditions encountered at the site, we recommend that a concrete septic tank be used. An existing two-compartment, 1,000-gallon septic tank is located at the site and appears to be in excellent condition. NWCC recommends a second two-compartment, 1,000-gallon septic tank be installed downstream of the existing tank. NWCC also recommends the new barn connect directly to the first chamber of the new 1,000-gallon tank.

A Biotube effluent filter (Orenco FT W0444-36) must be installed in the outlet 'T' of the second septic tank. NWCC recommends a high-water alarm be installed in the 2nd compartment of the septic tank to warn the owner in the event of a filter clog. The manhole lids must be exposed at final grades. Manhole ring extensions should be used as needed to reach final grades. The tank must be placed to allow access for pumping. Generally, a septic tank can be pumped from 100 feet away with a maximum lift of 10 feet; however, a local sewage pumping contractor should be consulted regarding tank maintenance access. The construction of an access road to allow for pumping the septic tank may be required.

The system design for the chamber trench system is presented in Figures #2 and #3. The septic tank details are presented in Figure #4. The design calculations are shown in Appendix A and the specifications for the system are given in Appendix B. **Any variance of equipment/materials specified in this design must be approved by NWCC prior to construction.**

**Operation and Maintenance:** Observing the operation and performing routine maintenance of the OWTS is essential to allow proper, long-term functioning of the system. NWCC recommends the operation be monitored and a qualified, licensed maintenance contractor provide maintenance of the system.

- 1) **Septic Tank:** The scum and sludge accumulation in the septic tank should be monitored yearly. Once the scum or sludge thickness reaches 25% of the chamber depth, the septic tank should be pumped. A pumping frequency of 1 to 3 years is likely at the design flows used for this system; however, depending on use, pumping may only be required every 3 to 5 years.
- 2) **Effluent Filter:** The effluent filter at the septic tank outlet should be cleaned when the septic tank is inspected or as required. If the high-water alarm sounds, the system should be inspected and serviced immediately.
- 3) **Soil Treatment Area:** Soil treatment area should be fenced off to livestock. The surface area around the soil treatment area should be observed monthly for signs of failure, such as lush vegetation growth or ponding. Liquid levels within the gravel bed or chambers should be observed through the inspection pipes.

- 4) Treated Water: NWCC does not recommend water softeners or water treatment systems be connected to the OWTS. The chemical and hydraulic loading from the backwash of these treatment systems may be detrimental to the OWTS. If a treatment system is used, a separate dry well should be constructed for the backwash waste. In addition, chemically treated water from a swimming pool or spa must not be discharged into the OWTS.
- 5) Floor Drains: NWCC does not recommend garage floor drain systems be connected to the OWTS. Oils, grease and chemicals from vehicles may be detrimental to the OWTS. NWCC recommends garage floor slab be sloped to drain to the garage door. If a garage floor drain is constructed, NWCC recommends the drain be connected to a separate sand/oil interceptor tank, which can be pumped as required or daylighted in accordance with current regulations.
- 6) General Notes: The owner should be aware that the operation of the OWTS is different from a public sewer service. Plastic and other non-biodegradable materials should not be placed into the system. Water use should be monitored so fixtures are not allowed to run if a seal malfunctions. Allowing fixtures to flow continuously to prevent water lines from freezing or a malfunctioning faucet or toilet can consume in excess of 1,000 gallons per day. Excessive flows could continually flood and cause premature failure of the system. No plastic or landscaping that requires additional irrigation should be placed over the soil treatment area.

**Limitations:** The procedures and design criteria used in this design were obtained from the EPA "Design Manual - On-site Wastewater Treatment and Disposal Systems", 1980, as well as the Colorado Department of Public Health and Environment-Water Quality Control Commission, On-site Wastewater Treatment System Regulation, Regulation #43, effective June 30, 2017.

The OWTS design presented is based on currently accepted design procedures, the proposed structures and usage of the facilities. If the usage of the structure or addition of new facilities to those currently planned in the building changes, the OWTS design will also most likely change. It should also be noted that all on-site wastewater treatment systems require periodic maintenance as noted above. The failure of the owner to provide periodic inspection and maintenance of the system can lead to premature system failure.

**Please be advised that Colorado law requires that a permit must be obtained prior to construction, alteration or use of an OWTS. In addition, the client must retain this office to observe the construction/installation of the OWTS and to provide an as-built report to the Routt County Department of Environmental Health when the construction is completed.**

If you have any questions concerning this report, or if we may be of further service, please contact this office.

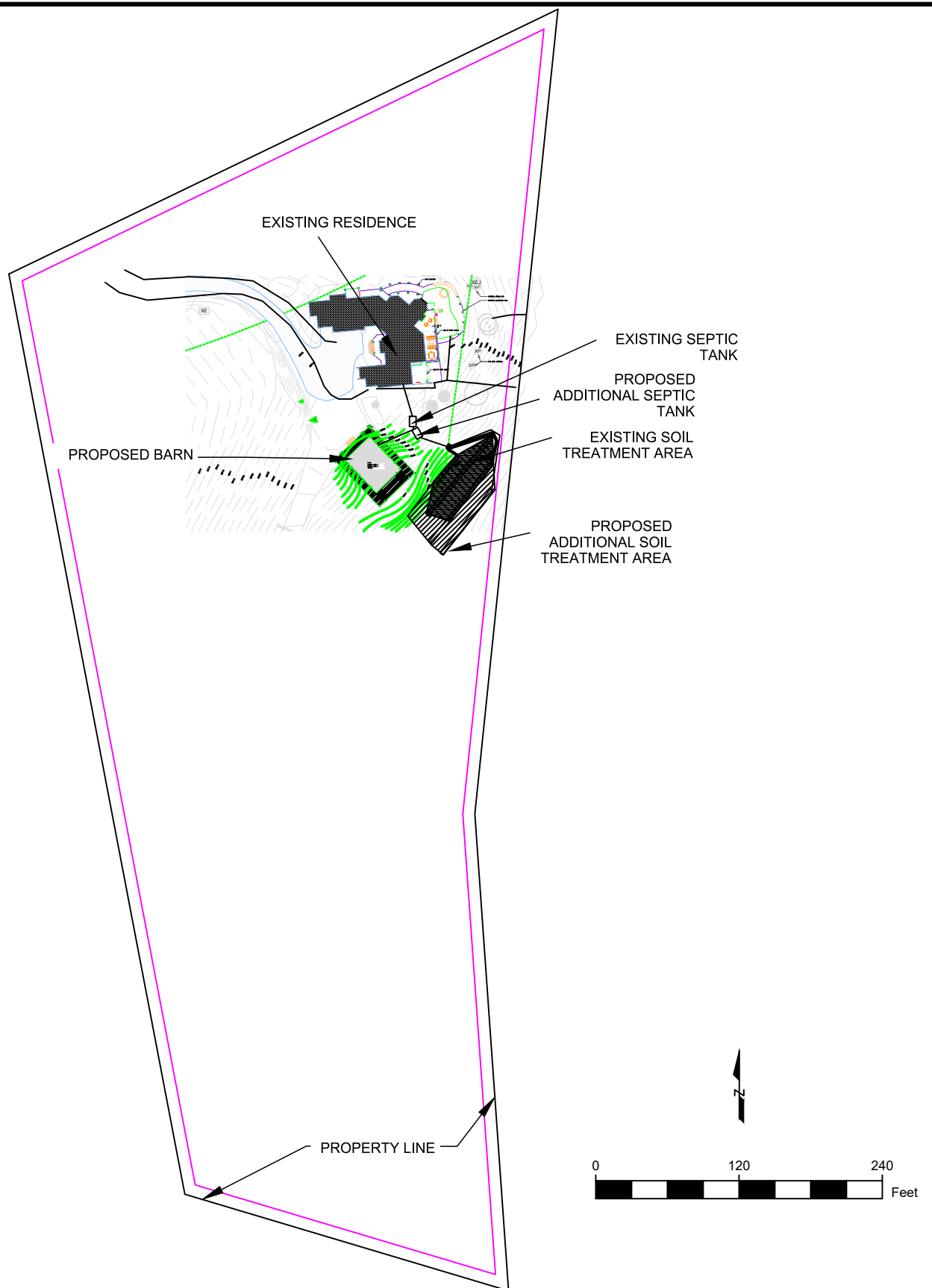
Sincerely,  
**NWCC, Inc.**

Erika K. Hill, P.E.  
Project Engineer

Reviewed by Brian D. Len, P.E.  
Principal Engineer 7-28-2023



Cc: Billy Texter – [billy@textermountainconstruction.com](mailto:billy@textermountainconstruction.com)



**Title:** OWTS – OVERALL SITE PLAN

**Date:** 7/21/23

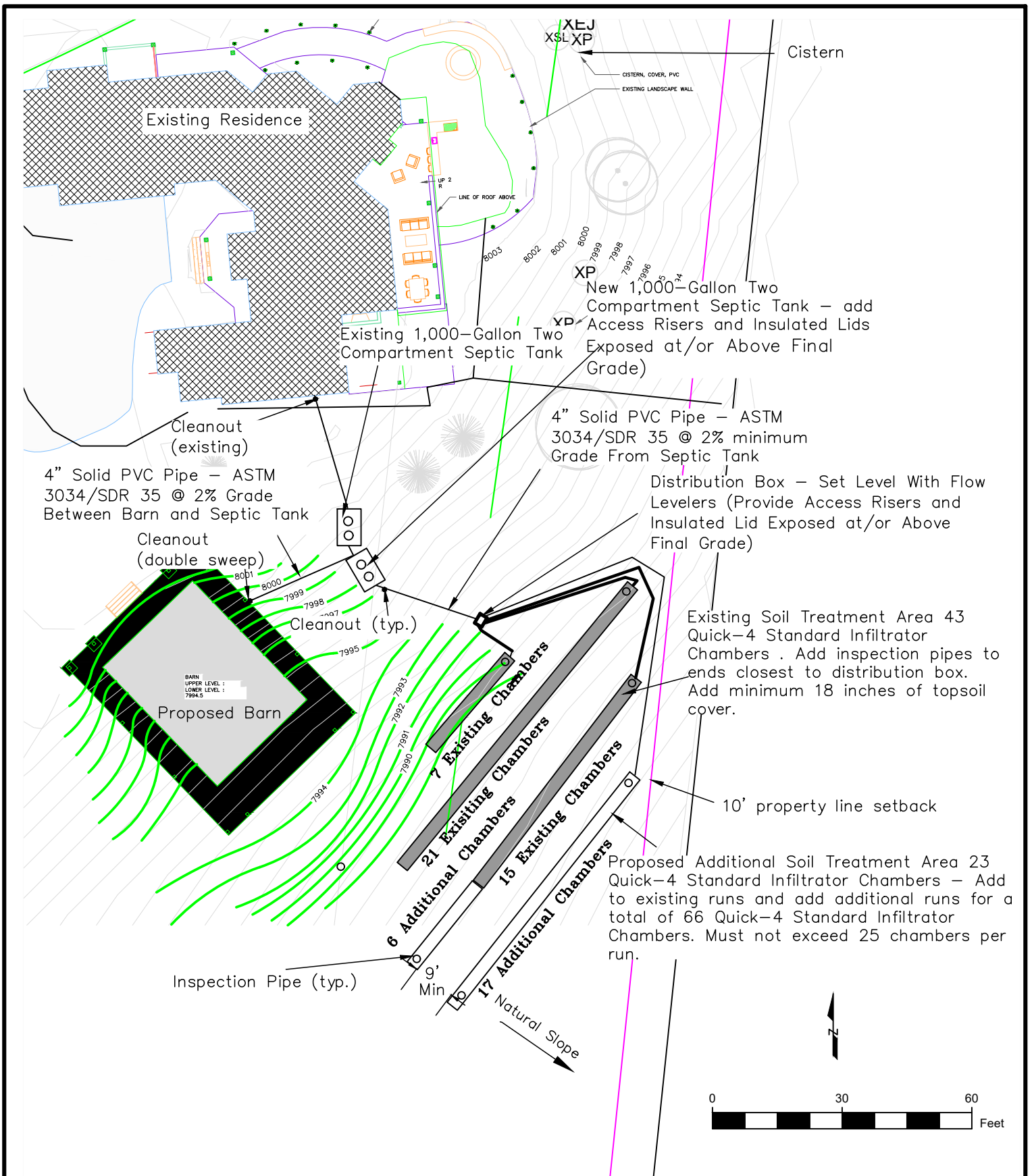
**Job Name:** Woodrow Residence

**Job No.** 23-12920

**Location:** 31555 Greenridge Drive, Routt County, Colorado

**Figure** #1





**Title:** OWTS – CHAMBERS SITE PLAN

**Job Name:** Woodrow Residence

**Location:** 31555 Greenridge Drive, Routt County, Colorado

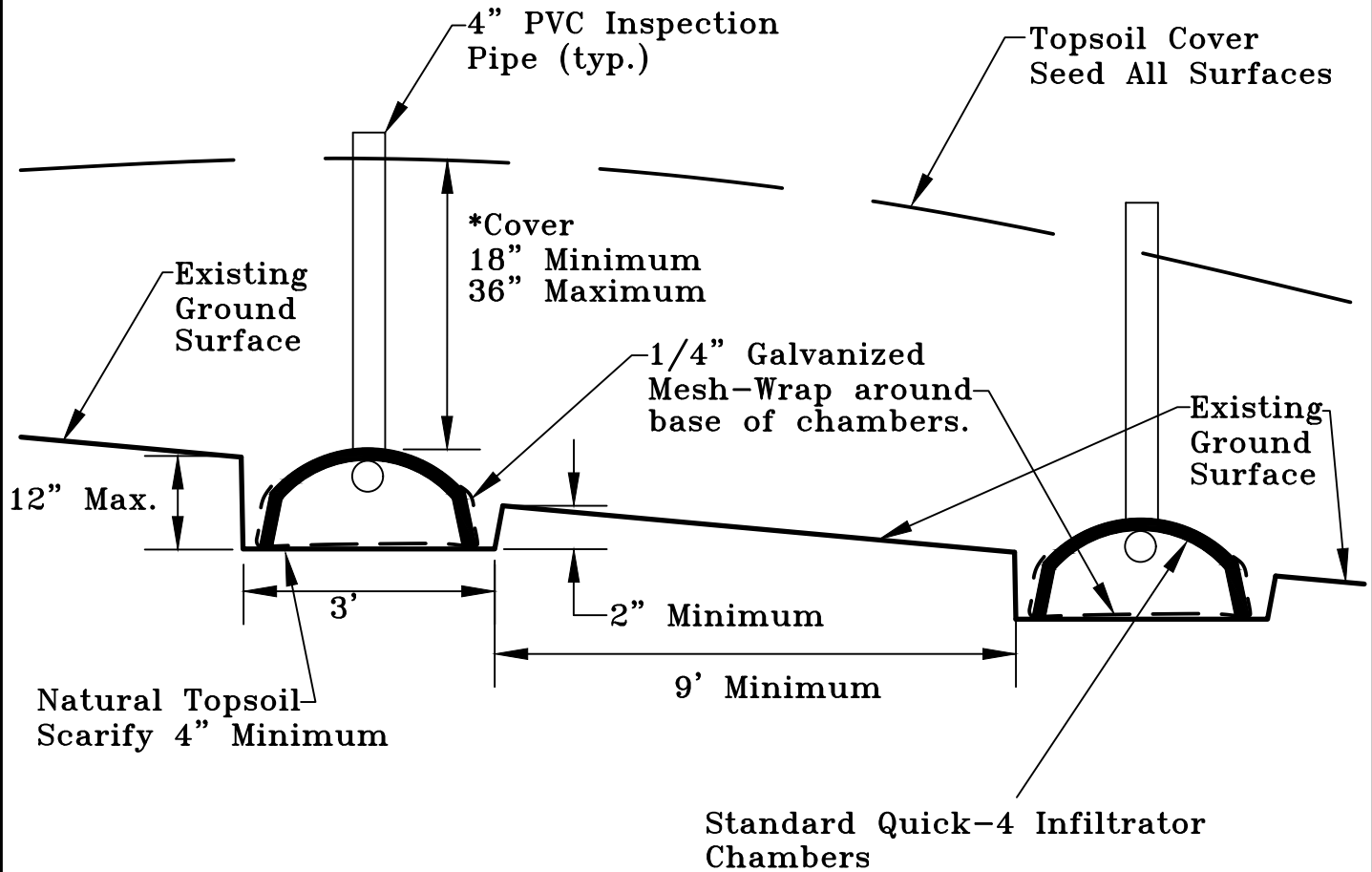
**Date:** 7/21/23

**Job No.** 23-12920

**Figure** #2



\* The chambers should be backfilled in accordance with the manufacturer's recommendations.



Title: CHAMBER/TRENCH SYSTEM CROSS SECTION

Date: 7/21/23

Job Name: Woodrow Residence

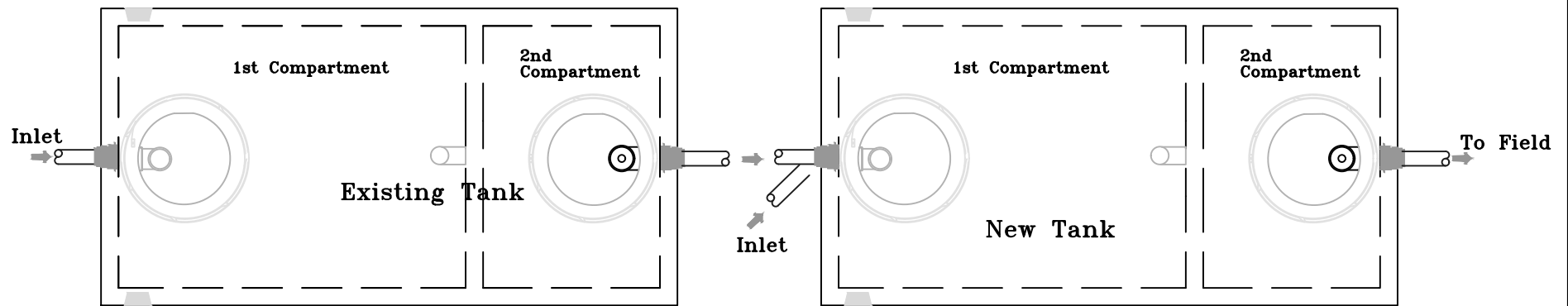
Job No. 23-12920

Location: 31555 Greenridge Drive, Routt County, Colorado

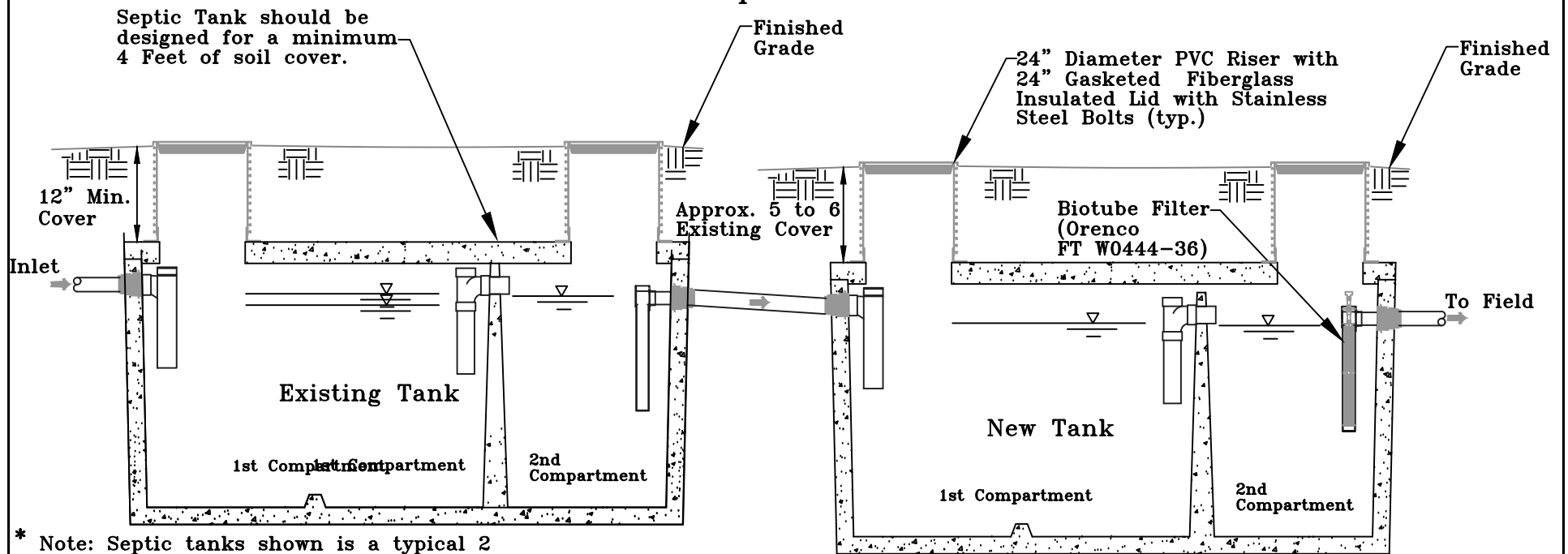
Figure #3








Top View



Section View

\* Note: Septic tanks shown is a typical 2 tank configuration. Installer must submit detail from septic tank manufacturer, for approval by NWCC prior to construction.

<b>Title:</b> OWTs-SEPTIC TANK DETAILS	<b>Date:</b> 7/21/23	
<b>Job Name:</b> Woodrow Residence	<b>Job No.</b> 23-12920	
<b>LOCATION:</b> 31555 Greenridge Drive, Routt County, Colorado	<b>Figure</b> #4	

## APPENDIX A

### SUMMARY OF DESIGN CALCULATIONS

#### A. Sewage Volume Calculations

- 1) Number of Bedrooms: ..... 6 Bedrooms
- 2) Design Flow (Regulations Table 6-1) .....Q = 675 gpd

#### B. System Sizing

- 1) Soil Type 2 (Table 10-1)
- 2) Minimum soil treatment area =  $Q/LTAR = 675 \text{ gpd}/0.60 \text{ gpd/ft}^2 = 1,125 \text{ ft}^2$
- 3) Infiltrator Area =  $1,125 \text{ ft}^2 \times 1.0 \text{ (Gravity Trench-Tab. 10-2)} \times 0.7 \text{ (Chambers-Tab 10-3)} = 788 \text{ ft}^2$ .
- 4) Number of Quick-4 Standard Infiltrator Chambers:  $788 \text{ ft}^2/12.0 \text{ ft}^2/\text{chamber} = 65.7 \text{ chambers} \Rightarrow$   
use sixty-six (66) Standard Quick-4 chambers.
- 4a) Existing Quick-4 Standard Infiltrator Chambers: 43  $\Rightarrow$  need 23 additional Standard Quick-4 chambers.
- 5) Septic Tank - 1,750-gallon septic tank minimum for a 6-bedroom residence (Table 9-1).  
Existing 1,000-gallon septic tank. Add an additional 1,000-gallon tank.

#### Minimum Horizontal Setbacks in Feet

	Spring, Well, Potable Water Supply Cistern	Potable Water Supply Line	Dwelling, Occupied Building	Property Line, Piped or Lined Irrigation Ditch	Waterbody (Lake, Water Course, Irrigation Ditch, Wetland)	Dry Gulch/Swale, Subsurface Drain, Intermittent Irrigation Lateral
Septic Tank/Dosing Tank	50	10	5	10	50	10
Building Sewer or Effluent Line	50	5		10	50	10
Soil Treatment Area	100	25	20	10	50	25

## APPENDIX B

- 1) The Rules and Regulations of the CDPHE and Routt County Department of Environmental Health must be complied with during the installation/construction of the system.
- 2) Periodic inspections must be made by NWCC at the following points during construction:
  - a. After subgrade excavation and septic/dosing tank and solid PVC pipe installation.
  - b. After placement of chambers, prior to backfilling.
  - c. Upon final completion of the project.
- 3) The 4-inch PVC pipe shall conform to ASTM 3034/SDR 35 or better quality.
- 4) Soils beneath the pipes entering and leaving a septic tank, which has been excavated, shall be backfilled in 6-inch lifts and mechanically compacted to a minimum of 95% of the maximum standard Proctor density.
- 5) Provide a minimum of 12 inches of soil cover over the septic tank, 18 inches of soil over the soil treatment area and 24 inches of soils cover over all pipes. Any piping placed under a driveway or other plowed areas should have a minimum of 48 inches of soil cover or be protected from freezing using insulation or other approved means. Manhole and distribution box lids must be exposed at final grades. Provide manhole ring or distribution box extensions as needed to reach final grades. Insulated lids are required.
- 6) Special care should be taken when backfilling the system to prevent disturbance/crushing of the distribution lines or chambers. In addition, the distribution lines must be carefully bedded to minimize the settlement in these lines.
- 7) Surface drainage shall be ditched and diverted away from the soil treatment area and all tanks.
- 8) Disturbed surfaces, mounds and berms shall be covered with topsoil and heavily seeded. Heavy farm equipment and livestock should be fenced or kept off of the soil treatment area.
- 9) Inspection pipes to be constructed of PVC pipe must be constructed to observe the infiltrative surface at bottom of chambers. Cleanouts must be placed in the solid distribution line upstream of the septic tank at maximum intervals of 100' or above any pipe bends 45 degrees or greater.
- 10) It is the responsibility of the owner and the installer to comply with all of the minimum setback requirements in the Regulations.