September 22, 2021

GOOD GROUND

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Albany, OH 45710
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info@goodground-llc.com

John Smith
Countrytyme Land Specialist LTD
3451 Cincinnati-Zanesville Rd SW
Lancaster, Ohio 43130-9205

RE: Findings for a Site and Soil Evaluation for a Subsurface Treatment System for a New Cabin at Tract 1, Blue Rock Church Road, Blue Rock, Ohio.

Dear Mr. Smith:

In accordance with our proposal sent to you on September 13, 2021, Good Ground LLC has conducted a site and soil evaluation to assess feasibility, to support design and to provide necessary documents for permitting through the Muskingum County Health Department (MCHD) of a new on-site subsurface wastewater dispersal and treatment system (STS) for a new domicile located at Blue Rock Church Road, Blue Rock, Ohio. The new cabin will be placed on property that is currently owned by Countrytyme Land Specialist LTD (Muskingum County parcel 40401712004). This property comprises 5.003 acres and is located in the northwest quarter of the southwest quarter of Section 17, Meigs Township, Muskingum County, as approximately shown on Figure 1. The new domicile is a 2 bedroom recreational cabin on pilings with an estimated daily wastewater output of 240 of gallons per day (gpd). The cabin is presently a framework without interior walls or plumbing.

On September 20, 2021, Good Ground LLC evaluated the site and collected soil data from multiple extractions using a 3" diameter soil auger to depths of up to 60 inches below the ground surface and a 60-inch pin probe. Soils were sampled in multiple locations. The collected soil data for 2 of these samples are attached to this letter report and identified as soil samples T1-1 and T1-4. Samples T1-2 and T1-3 presented shallow bedrock and were not logged. Soil sample points were flagged in the field and GPS-located using a Trimble GeoXH 6000 unit. GPS data were imported into an ArcGIS format for map depiction. Soil sample locations are illustrated on Figures 1 and 2.

The new cabin is located on a south-facing hillslope adjacent to an alluvial fan. The assessment area includes the hillslope southwest of the new cabin location and the alluvial fan. There is an intermittent stream channel east of the cabin site that restricts the usable area for septic management to approximate 1 acre downhill of the cabin. There is approximately 40 feet of topographic relief within the assessment area. Slopes range from 5 to 45 percent. The current land use is mixed successional forest. There are no risk factors or restrictive features within 50 feet of the assessment area.

Soils are formed in residuum and colluvium from sandstone and siltstone. Soils within the assessment area are mapped in the USDA Soil Survey of Muskingum County as Guernsey-Upshur silty clay loam (GtD2) and Lowell silt loam (LpD2). Soils observed resemble the Upshur clay at depth. Upper soil layers are channery and resemble the Lowell soil. Shallow bedrock was not observed within 60 inches of the surface at sample T1-1 and T1-4. Shallow bedrock was observed at samples T1-2 and T1-3 at 17 and 39 inches, A shallow seasonal or apparent water tables was observed at 35 inches of the surface at sample T1-1.

Selection of the assessment area is based on site topography, soil conditions and other natural or man-made features observed on the site. Design of the on-site subsurface wastewater treatment system is based on the most restrictive soil infiltration and permeability characteristics observed in the selected sample for the installation area. Collected soil characteristics for soils at least 18 inches below the surface were used with the Tyler Table (Table 1) to estimate the infiltration loading capacity, minimum infiltration area and minimum trench length for a primary and a replacement infiltration trench field for the new 2-bedroom cabin. The design layer for this treatment system is clay, which has an infiltration loading rate of 0.2 gallons per day per square foot. Daily design flow is based on the domestic default volume of wastewater production of 120 gpd per bedroom, or 240 gpd for the proposed cabin.

Table 1: Tyler Data for Calculation for Absorption Area and Dispersal Trench Length - Simple Infiltration Trench System

		Structure		Infiltration Loading Rate	Loading Rate Conditions		Hydraulic Linear Loading Rate (gal/day/lf)					
Soil Sample Number	Texture	Shape	Grade	> 30 mg/l BOD (gal/ day /ft^ 2)	Slope %	Infiltration Distance (inches)	Infiltration Distance Factor	Design Flow (gpd)	SF/LF 24" Trench	Infiltration Area (SF)	Infiltration Component Length (ft)	Total Trench Length (LF)
T1-1	C	BK	3	0.2	10	24-48	3.4	240	2	1200	71	600
T1-4	C	BK	2	0.2	10	24-48	3.4	240	2	1200	71	600

In addition to the minimum absorption area and minimum trench lengths derived through use of the Tyler Table, Ohio Health Department regulations require a "resting" area component. The resting area must be a minimum of 25% addition to the Tyler Table-derived design figures. The use of gravelless chambers, instead of gravel-filled trenches, allows reduction of the total length of trenches required, while continuing to accommodate the required resting trench area. Tables 2 and 3 (attached) present the calculations for a gravel infiltration trench system, for gravelless system with the resting area burden added, and for an ATL system[1].

Given the findings presented in Tables 1 and 2, the use of a gravelless chamber-based subsurface treatment system for wastewater dispersal would not be feasible and nor recommended for a new gravity-driven STS for the new cabin. The clay soils, the steep slopes and the alignment and proximity of an intermittent stream channel would result in the need for five 130-foot chamber trenches with 17 foot intertrench spacing. The field size for such a system would require an area of approximately 78 feet by 130 feet, which cannot be accommodated on the west side of the intermittent stream channel. The use of an ATL

[1] Design and Installation Manual for the Infiltrator ATL system in Ohio. 2014. Infiltrator Systems Inc. a link to the manual is provided in Septic System Components attachment to this document.

sand bed system is recommended due to the spatial, topographic and edaphic restrictions predominant at the site.

The minimum ATL septic system components for the new cabin would include:

- A 1000 gallon septic tank,
- Approximately 130 feet of 4-inch sewer pipe with joints and clean-out ports to connect the cabin to the septic tank and the septic tank to the distribution box,
- An accessible 3-port parallel distribution box with shut-off valves meeting the specifications of OAC Appendix A rules 3701-29-15.1 (F),
- Approximately 15 feet of 4-inch pipe to connect individually from the distribution box to each trench inlet.
- Two 72-foot long by ATL conduits within a an 18-inch deep, 11 foot wide, 74 feet long ASTM C33 cement sand bed,
- Three downslope observation ports composed of 4-inch PVC with caps.

All materials and equipment used for STS construction must meet the requirements of OAC 3701-29. A layout of the STS is shown on Figure 2 using the gravelless chamber trenches. The replacement system for the new cabin would be constructed southeast of the primary system, as also shown on Figure 2. The ATL system for the replacement system as shown would be the same dimensions the primary ATL.

The ATL sand bed would be excavated along the contour to a maximum depth of 24 inches and covered with reserved topsoil. The 74-foot sand bed plus the downhill sand wedge would require approximately 53 cubic yards of sand. Take care during construction to preserve soil infiltration capacity by not grading deeply or working when the soil is saturated. Should there be trees within the sand bed area, do not grub. Cut them to the ground and excavate through the root system. The location selected for STS Field 1 as shown on Figure 2 appears to be the most practical option given the cabin location, the site topography and the soil conditions.

The next step is identification of the STS system materials that considers actual system components and comparative system costs. These are choices that you the homeowner will make in consultation with your selected Ohio Environmental Protection Agency (OEPA) certified STS installer and MCHD. All materials and equipment used for STS construction must meet the requirements of OAC 3701-29.

A final specification of materials, a field layout and a final field sketch may be needed to obtain a permit to install the septic system in Muskingum County. It is likely that your chosen Ohio EPA-certified system installer can provide specifications, a list of materials and costs. The county health department sanitarian will most likely inspect the field layout prior to installation permit issuance. As result, the location of the new STS trench field, septic tank and distribution box will need to be finally marked on the ground by your selected installer. The MCHD can provide further guidance on system final documents, application forms that are needed, certified STS installers, and the names of septic system design engineers that could be needed for more complex systems.

This report is for the sole and only use of John Smith, Countrytyme Land Specialist LTD, or the owners of record of the subject property in support of obtaining a permit to install a subsurface septic treatment and dispersal system from the MCHD and shall not be used or relied upon by any other person, firm, corporation, or other entity. Please contact me if you have any additional questions. Thank you for allowing Good Ground LLC to assist you with this project.

Robert L. Wiley, President,
Good Ground LLC

Attachments: Figure 1, Figure 2
Tables 2 and 3
2 Soil Data Forms

TABLE 2 Infiltration Trench Length Calculations

Parcel	40401712004
Owner/Client:	Countytuyme - John Smith

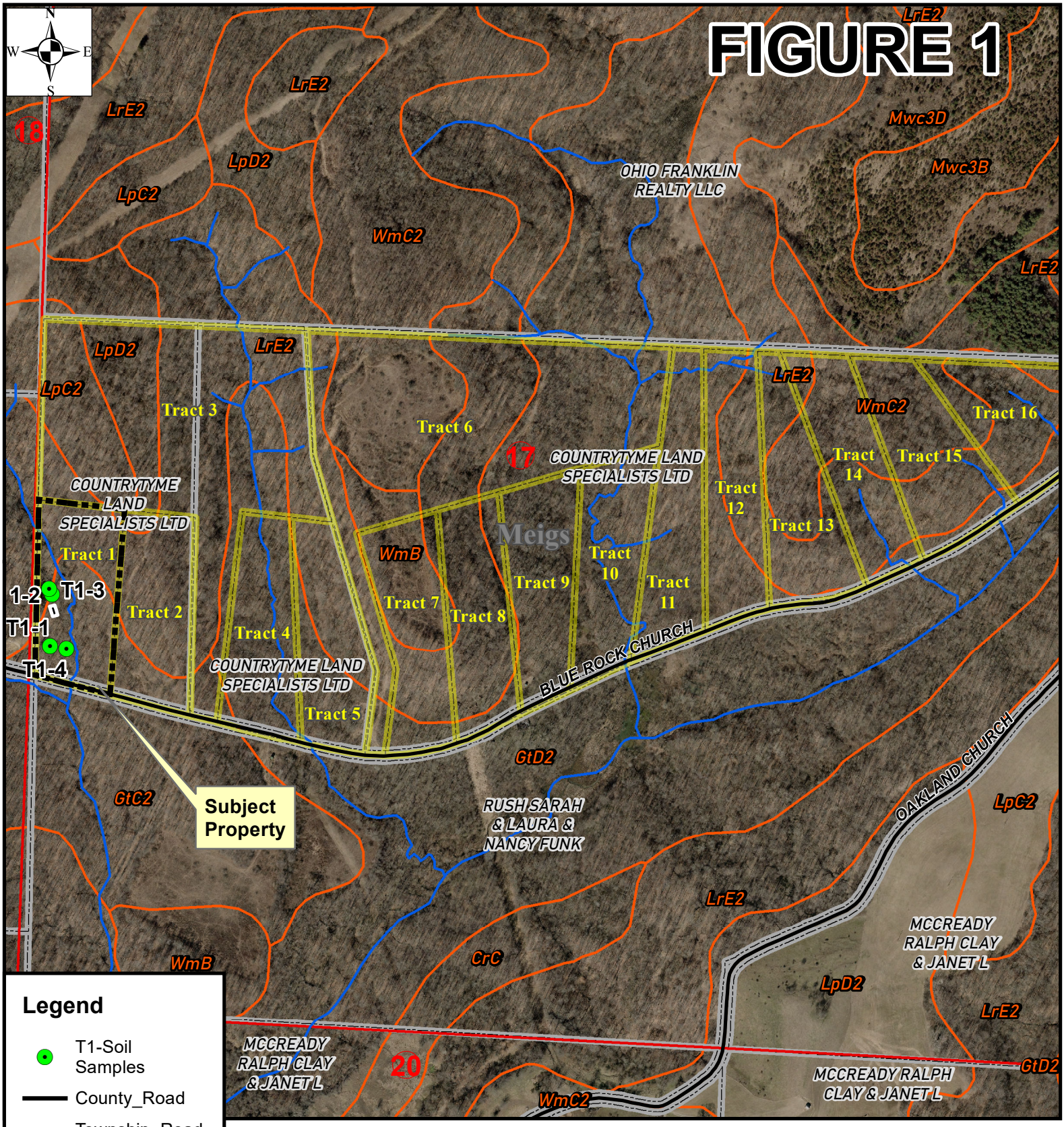
Calculation of the Trench Bottom Area and Trench Length Required for Shallow Leaching Gravel Infiltration Trenches

Design Parameters	Value	Comment
Wastewater Source:	New cabin	Manual Input
Condition:	New Domicile	Manual Input
Daily WW Volume (gal/day):	240	Manual Input
Soil		
Texture	C	Soil data sheet input
Shape	BK	Soil data sheet input
Grade	3	Soil data sheet input
Sample	T1-1	Tyler Table input
Tyler Table Data		
Loading Rate (gpd/sf)	0.2	Tyler Table input
Slope (%)	10	Soil data sheet input
Infiltration Distance (inches)	24-48	Soil data sheet input
Tyler Calculations		
Infiltration Area (sf)	1200	Daily WW volume/Loading Rate in gpd/sf
Hydraulic Loading Rate (gpd/lf)	3.4	Tyle Table input
Minimum Trench Length (ft)	71	Infiltration area/min trench length for 24" trench
Proposed Trench Width (ft):	**2**	Manual input
Number of Minimum Length Trenches Needed	8.50	Total Trenches needed at minium length
On-Site Feasible Trench Length (ft)	**125**	Manual input length needed for 3 equal trenches
Number of Feasible-length Trenches	**5**	Infiltration area/feasible trench length
Resting Trenches (min 25% addition)	2	Additional resting trenches
Total Number of Trenches Needed at on-site feasible Length:	**7**	Number of trenches needed for Shallow Gravel Infiltration System
Absorption Base Width:	**17**	HLLR/soil infiltration rate

The required minimimum bottom area for a Gravelless trench (chamber) shall be no less than 75% of a shallow gravel infiltration trench

Calculation of the Trench Bottom Area and Trench Length Required for Gravelless (chamber) Infiltration Trenches

Total Infiltration area using chambers (sf)	900	Total infiltration area X 0.75
Minimum Trench Length (ft)	71	Infiltration area/min trench length for 24" trench
Number of Minimum Length Trenches Needed	6.4	Total Trenches needed at minium length
On-Site Feasible Trench Length (ft)	110	Manual input length needed for 3 equal trenches
Round to Number of Uncut 4' Sections	**112**	Total actual trench length for uncut sections
Minumum Infiltration Trenches Needed	4	Actual trench length/minimum number of chambers needed
Resting Trenches (min 25% addition)	1	Additional resting trench
Total Number of Trenches Needed at On-site Feasible Length:	**5**	Number of trenches needed for a Gravelless chamber infiltration system



Legend

- T1-Soil Samples
- County_Road
- Township_Road
- Tract_1
- Bluerock_Pro...
- Stream
- Section
- Township
- Parcel
- USDA Soils

SITE FEATURES AND LOCATION

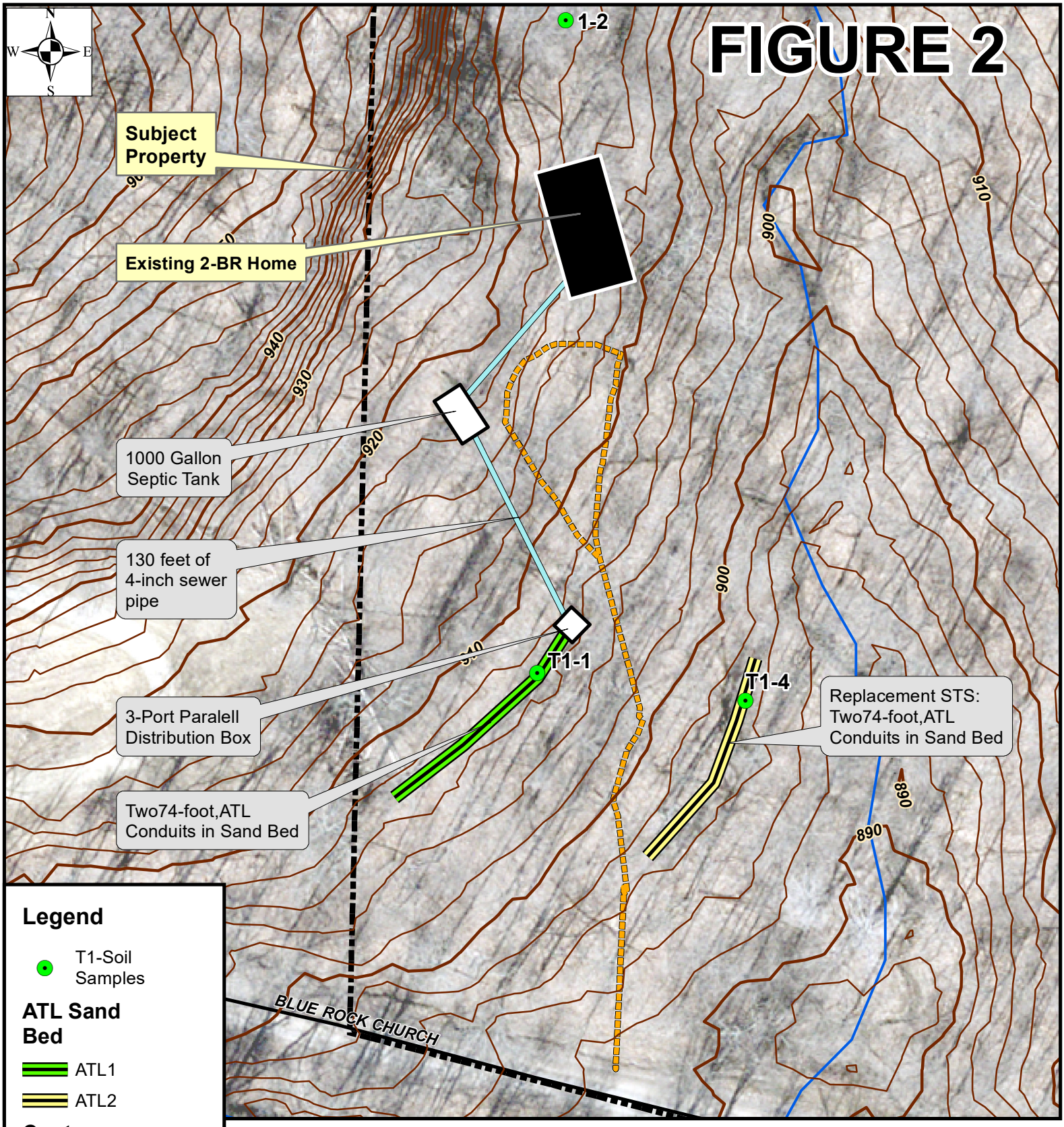
Tract 1- The Woods at Blue Rock
Blue Rock Church Rd, Blue Rock
Section 17, Meigs Township

400 200 0 400 Feet

1 inch = 500 feet

Contour Interval: NA

Prepared by Good Ground LLC. 092221
Planimetrics: Muskingum County Auditors DB & 2014/2020 OGRIP: http://gis5.oit.ohio.gov/geodatadownload/
Coordinate System: NAD 1983, Ohio State Plane, Feet.
Parcel Data based on "Parcels 0820"
Soil code key found in Muskingum County Soil Survey. USDA, ODNR, 1985.



SEPTIC SYSTEM DESIGN LAYOUT

Tract 1- The Woods at Blue Rock
Blue Rock Church Rd, Blue Rock
Section 17, Meigs Township

30 15 0 30 Feet

1 inch = 40 feet

Contour Interval: 2 Feet

Prepared by Good Ground LLC. 092221
Planimetrics: Muskingum County Auditors DB & 2014/2020 OGRIP: http://gis5.oit.ohio.gov/geodatadownload/
Coordinate System: NAD 1983, Ohio State Plane, Feet.
Parcel Data based on "Parcels 0820"
Soil code key found in Muskingum County Soil Survey. USDA, ODNR, 1985.

Site and Soil Evaluation for Sewage Treatment and Dispersal

TH# T1-1

County:	Muskingum	**Landuse/ Vegetation:**	Mixed Successional Forest
TWP./Section:	Meigs Township, Section 17	**Landform:**	Hillslope
Property Address/Location:	Tract 1, Blue Rock Church Road Blue Rock, Ohio 43720	**Position on Landform:** **Percent Slope:**	Upland 10-15%
Applicant Name:	Countytuyme - John Smith	**Slope Shape:**	convex
Applicant Address:	3451 Cincinnati-Zanesville Road	**Date:**	September 20, 2021
Applicant Address:	Lancaster, Ohio 43130	**Evaluator:**	Robert L. Wiley
Phone #:	614-540-8998		3050 Glennfinnan Drive
Lot #:	40401712004		Albany, OH 45710
Test Hole #:	T1-1	**Mapped soil type(s):**	
Lat./Long; ddms	39.80762871°N 81.79016190°W		GtD2—Guernsey-Upshur silty clay loams
Method (circle):	Pit **Auger** Probe All		LpD2—Lowell silt loam

Cert. Stamp or Cert. #: ODH Certified April, 2016

Signature: R L Wiley

740-698-9100

Soil Profile		Estimating Soil Saturation			Estimating Soil Permeability							
		Munsell Color										
			Active Redox Features		Texture			Structure				
Horizon	Depth (inches)	Matrix Color	Concretions	Depletions	Class	Approx. % Clay	Approx. % Fragments	Grade	Size	Type (shape)	Consistence	Other Soil Features
A	0-15	10YR3/2	NONE	NONE	l	20	<1	2	m	sbk	fr	
B1	15-25	10YR3/3	NONE	NONE	l	25	<1	3	m	abk	fr	
B2	25-35	10YR4/6	NONE	NONE	cl	30	<1	3	m	abk	fr	
B3	35-49	10YR4/3	10YR2/1	7.5YR7/1	c	45	<1	3	lg	abk	fr	
B4	49-55	10YR5/4	NONE	NONE	cl	35	<1	3	lg	abk	fr	
B5	55-60	5YR3/4	NONE	NONE	sil	20	<1	2	f	abk	fr	

Limiting Conditions	Depth to (inches)	Descriptive Notes	Remarks/ Risk Factors:
Perched Seasonal Water Table	35		
Apparent Water Table	Not Encountered		
Highly Permeable Material	Not Encountered		
Bedrock	Not Encountered		
Restrictive Layer	35		

Site and Soil Evaluation for Sewage Treatment and Dispersal

TH# T1-4

County:	Muskingum	**Landuse/ Vegetation:**	Successional Forest
TWP./Section:	Meigs Township, Section 17	**Landform:**	Hillslope
Property Address/Location:	Tract 1, Blue Rock Church Road Blue Rock, Ohio 43720	**Position on Landform:** **Percent Slope:**	Upland 10-15%

Applicant Name:	Countytuyme - John Smith				**Slope Shape:**	convex	**Cert. Stamp or Cert. #:**
Applicant Address:	3451 Cincinnati-Zanesville Road				**Date:**	September 20, 2021	
Applicant Address:	Lancaster, Ohio 43130				**Evaluator:**	Robert L. Wiley	ODH Certified April, 2016
Phone #:	614-540-8998				3050 Glennfinnan Drive		**Signature:**
Lot #:	40401712004				Albany, OH 45710		
Test Hole #:	T1-4				**Mapped soil type(s):**		
Lat./Long; ddms	39.80780234°N		81.78748017°W		GtD2—Guernsey-Upshur silty clay loams		
Method (circle):	Pit	**Auger**	Probe	All	LpD2—Lowell silt loam		740-698-9100

Soil Profile		**Estimating Soil Saturation**			**Estimating Soil Permeability**							
		Munsell Color										
			Active Redox Features		Texture			Structure				
Horizon	Depth (inches)	Matrix Color	Concretions	Depletions	Class	Approx. % Clay	Approx. % Fragments	Grade	Size	Type (shape)	Consistence	**Other Soil Features**
Ab	0-8	5YR4/3	NONE	NONE	cl	35	1-5	2	m	sbk	fr	
BE1	8-60	5yYR4/6	NONE	NONE	c	65	<1	2	vf	abk	fr	

Limiting Conditions	**Depth to (inches)**	**Descriptive Notes**	**Remarks/ Risk Factors:**
Perched Seasonal Water Table	Not Encountered		No restrictions
Apparent Water Table	Not Encountered		There is an intermittant stream within 80 feet
Highly Permeable Material	Not Encountered		
Bedrock	Not Encountered		
Restrictive Layer	Not Encountered		

Septic System Components Reference Links

The following list includes some URL hot links to images and information about common septic systems and components. These are provided as examples of the products and materials that may be used by an installer to create your new or replacement septic system. These are provided as information only. There are many more such links and product types if searched by product name in your favorite search engine. The actual product configurations, brands, models and materials vary in form and cost from place to place. Discuss brands and costs with your selected septic system installer. Good Ground LLC does not specifically endorse or recommend the use of any products or manufacturers. Use Ctrl-left click while hovering to activate link and access the site, or highlight, copy and paste the link into your browser.

Simple Septic System: https://flatheadlakers.org/programsissues/safeguarding-flathead-lake/sewage-treatment-septic-systems/

https://ohiowatersheds.osu.edu/resources/human-dimensions/mental-models/septic-maintenance-and-upgrades

Septic Tank: https://buildwithabang.com/the-lowdown-topics/the-best-septic-tanks-for-your-home

Concrete Septic Tank: https://www.concrete-info.com/concrete-septic-tank/

http://www.dixieseptictanks.com/concrete-septic-tanks.cfm

Plastic Septic Tank: https://www.aandpsepticllc.com/new-tanks.php; http://fltanks.com/product/septic-tank-overview/

https://www.plastic-mart.com/product/7881/1500-gallon-two-compartment-plastic-septic-tank-ast-1500-2

https://www.environmental-expert.com/products/model-im-1530-plastic-septic-tank-129372

Lift Station: https://www.xylem.com/en-us/brands/flygt/flygt-engineering--expertise/pump-station-design/packaged-pump-stations/

https://www.sumppumpsdirect.com/Zoeller-915-0005-Sewage-Pump/p61880.html?gclid=EAIaIQobChMI6Pil1cyB6gIVVdyGCh17OAtyEAQYBCABEgJ4G_D_BwE

https://www.amazon.com/XY-Stainless-Submersible-Agricultural-Household/dp/B07PN221VY

Grinder Pump: https://inspectapedia.com/septic/Septic_Pump_Inspection.php

Parallel Distribution Box: https://www.northboroseptic.com/about/distribution-box-replacement-repair/;

https://polylok.com/blog/2013/01/25/product-review-equal-flow-distribution-boxes/

Wastewater Infiltration Trench: https://www.thenaturalhome.com/septic/

Conventional Infiltration Trench: https://www.pinterest.com/pin/489414684481198549/

https://www.researchgate.net/figure/Schematic-of-layout-and-main-processes-a-plan-and-cross-section-view-of-the-trenches_fig2_43505903

Chamber Infiltration Trench: https://thetanksource.com/septic-tank-chambers/

https://www.pinterest.com/pin/558094578795732505/

https://ossf.tamu.edu/leaching-chamber/

Ultra-Violet Disinfection System: https://ultraviolet.com/well-water-contamination/

https://www.septicsafe.com/salcor-uv-ultra-violet-septic-disinfection-light-model-3g/

Aerator: https://tgwastewater.com/flagg-air-340ht-j-septic-aerator-jet-replacement

https://www.septicsolutions.com/septic-parts/septic-tank-aerator/sepaerator-packages/sepsaverpkgplus_sepaerator-saver-package-plus---septic-tank-aerator

Mound System: https://ohioline.osu.edu/factsheet/aex-744

https://inspectapedia.com/septic/Septic_Mound_Design.php

Sprinkler System: https://www.conroesepticservice.com/services

https://edmondok.com/1514/Aerobic-Treatment-Maintenance

Infiltrator ATL System Design and Installation Manual: https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/sewage-treatment-systems/pretreatment-comp/infiltrator-atl-oh-manual-rev-081414