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Property Evaluation

Portion of Tax Map Parcel 21.00-4-80.1
Clay Hill Road and Stonitch Drive
Town of Durham, Greene County, NY
November 5, 2020
KA Project 283720

Introduction

Kaaterskill Associates has performed an evaluation of a portion of tax map parcel 21.00-4-80.1 in the Town of Durham. This included soil testing performed on October 15, 2020.

Tax Map parcel 21.00-4-80.1 is located at the intersection of Clay Hill Road and Stonitch Road in the Town of Durham, Greene County, NY. Based on the Greene County GIS web map, the overall parcel is approximately 90.7 acres. This evaluation focused on a portion of the property located south of Stonitch Road and east of Clay Hill Road, consisting of approximately 18 acres (as measured using the measuring tool available on the GIS web map.) The expectation is that this portion of the overall parcel will be subdivided.

Attached to this report are the following documents:

- Print-out from the GIS Web Map showing the project area.
- Sketch of locations of test pits performed in the project area.
- Test pit data (6 sheets).
- Excerpts from the NYS DOH Residential Onsite Wastewater Systems Design Handbook (4 sheets).

Soil Testing

Soil test results and a sketch of the soil test locations are attached to this report.

Twelve test pits were performed on the property. Hardpan (fragipan) was encountered in all of the test pits. The depth to the hardpan varied from 7"-10" below grade. Mottling (soil discoloration due to frequent saturation) was noted at the same approximate depth as the hardpan layer. Due to the shallow depth of hardpan, no percolation tests were performed.

NYS DOH Appendix 75-A contains the regulations for design of septic systems for new individual residences. Appendix 75-A discusses "conventional" (in-ground) systems and "alternative (raised) systems. For raised system, Appendix 75-A states that the minimum requirements include "at least one foot of original soil with a faster than 60 minutes percolation rate, above any impermeable soil layer or bedrock". The project area does not meet this minimum requirement.

Septic System Conceptual Description

The New York State Department of Health has also issued additional design guidance in the "Residential Onsite Wastewater Systems Design Handbook". The Design Handbook addresses the situation where a

site does not meet the minimum 12" "usable" soil. This is addressed in section 9.6.2 of the Design Handbook, and also illustrated in Figures 38 and 38A. Excerpts from the Design Handbook are attached.

In the course of this evaluation, the NYS DOH was contacted to discuss alternatives to the design illustrated in the Design Handbook. Based on that correspondence, it is understood that a design based on the attached sections of the Design Handbook would be needed for this site.

For a 3-bedroom house the septic system may consist of the following:

- A new 1,000-gallon septic tank.
- Imported fill material that conforms to the attached Figures 38 and 38-A.
- An absorption field consisting of four 60' absorption trenches (based on an assumed fill material percolation rate).
- Drainage improvements (curtain drain) to protect the disposal field.

For such a system we would offer an opinion of probable construction cost of $112,000. Please note the following:

- The system will include an estimated 3,000 cubic yards of suitable fill material. The estimated cost of this material was based on $21.96/CY. (The cost per cubic yard estimate for the fill material includes including hauling and placement). The estimate for the fill material is therefore $65,880. A 15% contingency was used in the estimate calculation, so the estimate for the fill material including the contingency is approximately $76,000. An additional estimate of approximately $18,300 ($15,900 plus 15%) was included to account for topsoil, seed, and mulch in the area of the proposed fill (which is approximately 0.5 acres). In summary, the fill material with topsoil/seed/mulch and 15% contingency accounts for approximately $94,300 of the $112,000 estimate.
- The estimate assumes that the elevation difference between the house and the septic system absorption field is sufficient to allow for gravity flow with flout dosing. If pump dosing is required, the estimate would be increased by approximately $2,500.
- Actual costs may vary from this estimate due to a variety of factors and estimates for construction may vary from contractor to contractor.
- In the course of the evaluation there was a discussion of siting the proposed house in a way that could allow for future subdivision of the 18+/- acre parcel to allow for a second house. Due to the size of the proposed septic system (as well as the need to designate a reserve area), it is expected that any future subdivision would be problematic.

The construction cost estimate does not include design fees. To prepare a complete design for a single lot septic system for this project, our office would charge a fixed fee of $3,000. There would be an additional cost during the construction phase for construction observation and sign-off on construction. For this project, it would be advisable to perform construction stakeout as well to ensure that the fill material is placed in the correct locations and to the correct depths. For construction stakeout and construction observation services, our office would bill hourly plus expenses with an estimate of $2,500.

* * * * *

November 5, 2020

Parcels

1:9,028

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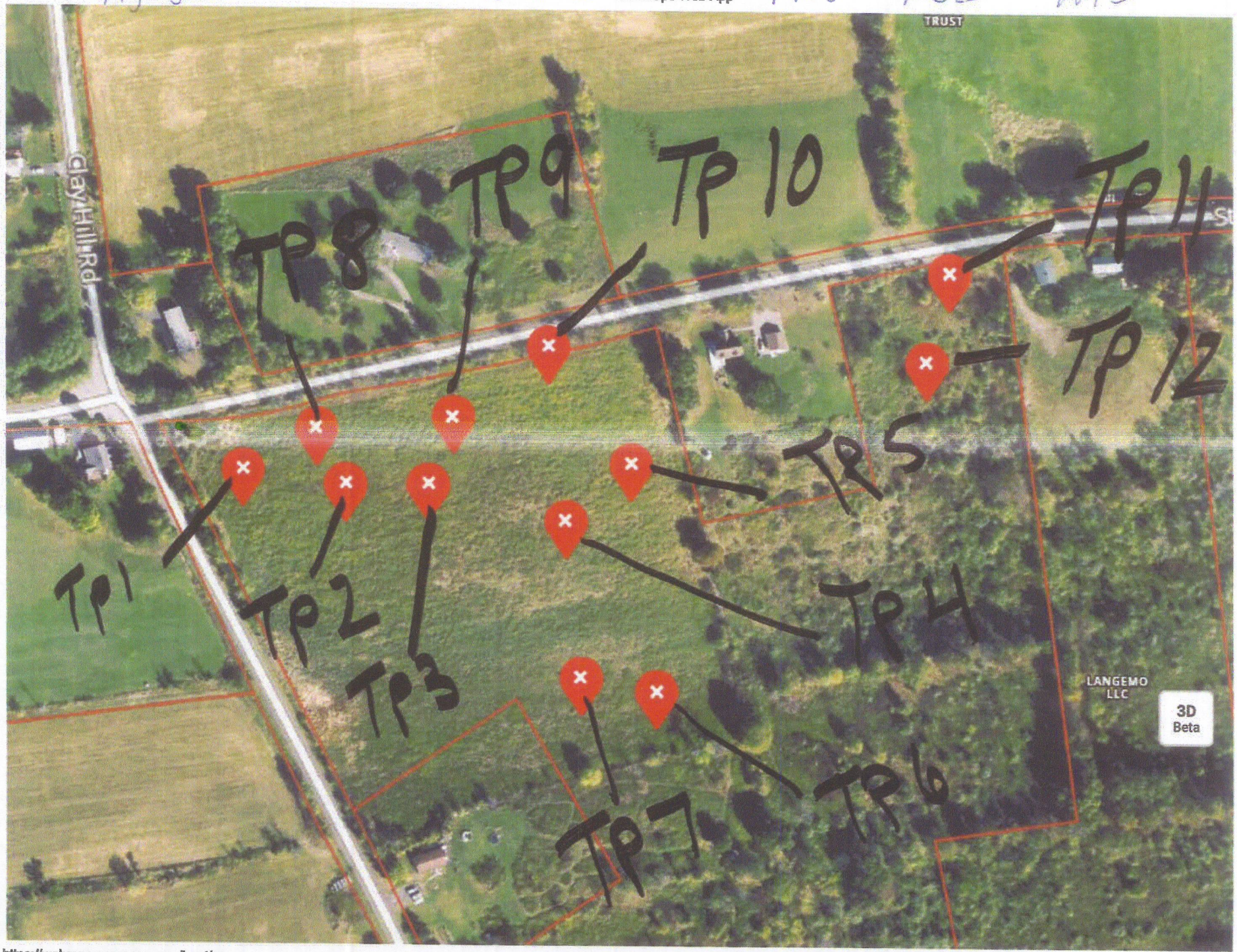
0 0.07 0.15 0.3 km

Greene County GIS, Esri, HERE, Garmin, INCREMENT P, Intermap, NGA,


TP8
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TP6
Clay Hill Rd
TRUST
LANGEMO LLC
3D Beta

SEWAGE DISPOSAL SYSTEM
DEEP HOLE TEST PITS

Date 2020-10-15
Project (name and number) 283720 Agostinoni
Weather Sunny 60s
Name MIS rjl
Present Client
Excavator Maggio

Deep Test No. 1

0"-9"	Silt Clay Loam
9"-26"	Hard Pan

DEPTH	Inches
Test Pit	26"
Roots	9"
Water	
Mottling	9"

Slope	

Other Info

Deep Test No. 2

0"-8"	Silt Clay Loam
8"-20"	Hard Pan

DEPTH	Inches
Test Pit	20"
Roots	8"
Water	
Mottling	8"

Slope	

Other Info

SEWAGE DISPOSAL SYSTEM
DEEP HOLE TEST PITS

Date 2020-10-15
Project (name and number) 283720 Agostinoni
Weather Sunny 60s
Name MIS ril
Present Client
Excavator Maggio

Deep Test No. 3

0"-7"	Silt Clay Loam
7"-16"	Hard Pan

DEPTH	Inches
Test Pit	16"
Roots	7"
Water	
Mottling	7"

Slope	

Other Info

Deep Test No. 4

0"-9"	Silt Clay Loam
9"-20"	Hard Pan

DEPTH	Inches
Test Pit	20"
Roots	9"
Water	
Mottling	9"

Slope	

Other Info

SEWAGE DISPOSAL SYSTEM
DEEP HOLE TEST PITS

Date 2020-10-15
Project (name and number) 283720 Agostinoni
Weather Sunny 60s
Name MIS rjl
Present Client
Excavator Maggio

Deep Test No. 5

0"-8"	Silt Clay Loam
8"-18"	Hard Pan

DEPTH	Inches
Test Pit	18"
Roots	8"
Water	
Mottling	8"

Slope	

Other Info

Deep Test No. 6

0"-10"	Silt Clay Loam
10"-22"	Hard Pan

DEPTH	Inches
Test Pit	22"
Roots	10"
Water	
Mottling	10"

Slope	

Other Info

SEWAGE DISPOSAL SYSTEM
DEEP HOLE TEST PITS

Date 2020-10-15
Project (name and number) 283720 Agostinoni
Weather Sunny 60s
Name MIS rjl
Present Client
Excavator Maggio

Deep Test No. 7

0"-8"	Silt Clay Loam
8"-20"	Hard Pan

DEPTH	Inches
Test Pit	20"
Roots	8"
Water	
Mottling	8"

Slope	

Other Info

Deep Test No. 8

0"-7"	Silt Clay Loam
7"-16"	Hard Pan

DEPTH	Inches
Test Pit	16"
Roots	7"
Water	
Mottling	7"

Slope	

Other Info

Rest Form

SEWAGE DISPOSAL SYSTEM
DEEP HOLE TEST PITS

Date 2020-10-15
Project (name and number) 283720 Agostinoni
Weather Sunny 60s
Name MIS rjl
Present Client
Excavator Maggio

Deep Test No. 9

0"-8"	Silt Clay Loam
8"-18"	Hard Pan

DEPTH	Inches
Test Pit	18"
Roots	8"
Water	
Mottling	8"

Slope	

Other Info

Deep Test No. 10

0"-7"	Silt Clay Loam
7"-16"	Hard Pan

DEPTH	Inches
Test Pit	16"
Roots	7"
Water	
Mottling	7"

Slope	

Other Info

SEWAGE DISPOSAL SYSTEM
DEEP HOLE TEST PITS

Date 2020-10-15
Project (name and number) 283720 Agostinoni
Weather Sunny 60s
Name MIS ril
Present Client
Excavator Maggio

Deep Test No. 11

0"-9"	Silt Clay Loam
9"-23"	Hard Pan

DEPTH	Inches
Test Pit	23"
Roots	9"
Water	
Mottling	9"

Slope	

Other Info

Deep Test No. 12

0"-9"	Silt Clay Loam
9"-29"	Hard Pan

DEPTH	Inches
Test Pit	29"
Roots	9"
Water	
Mottling	9"

Slope	

Other Info

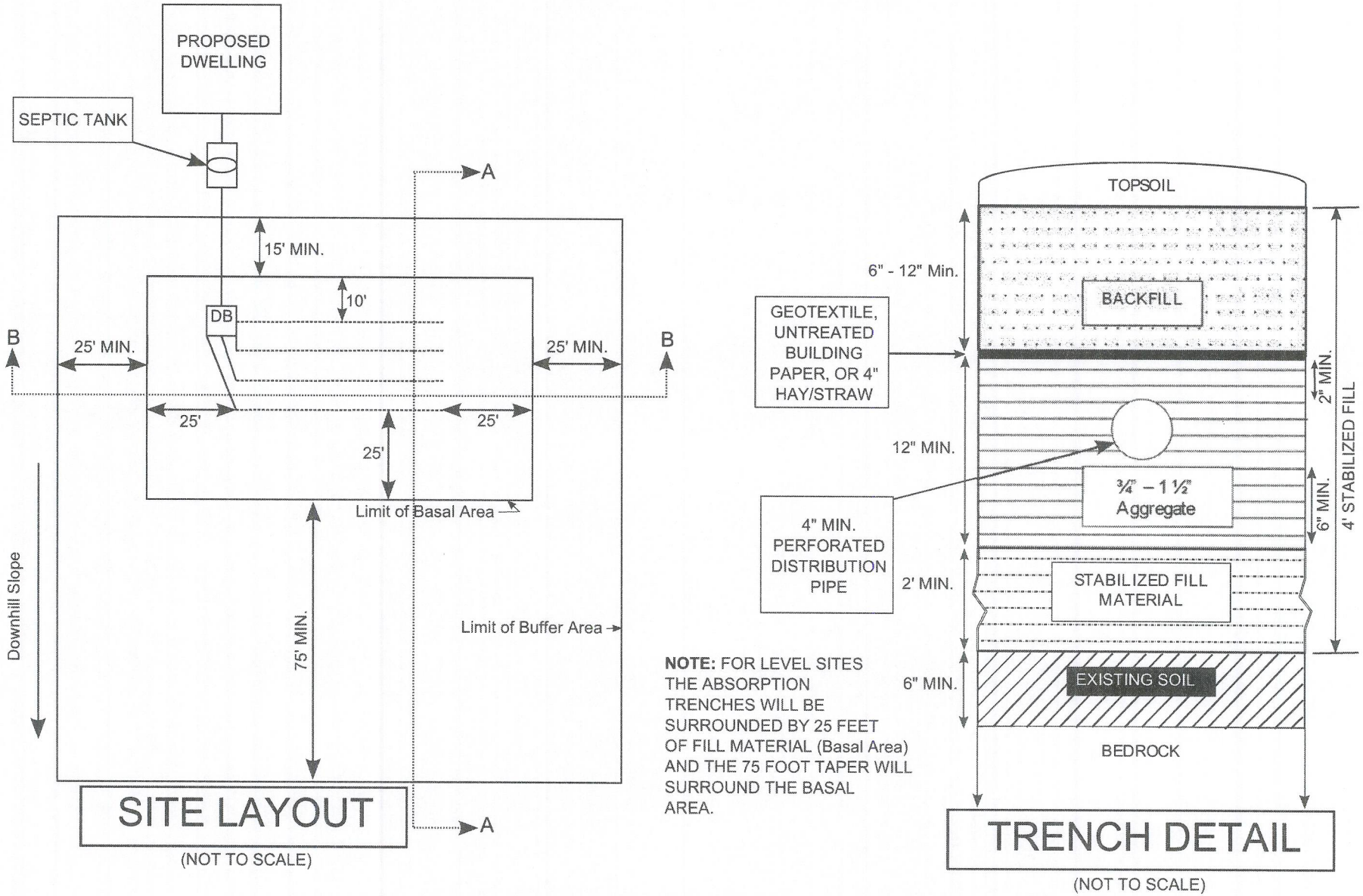
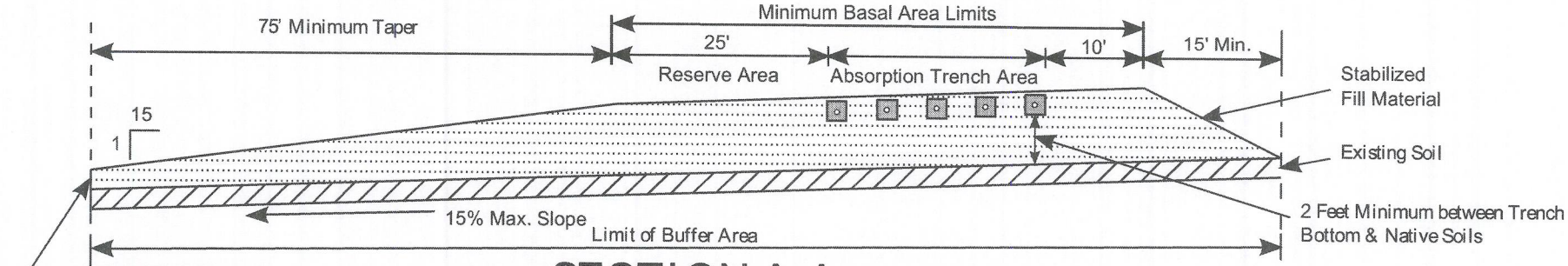
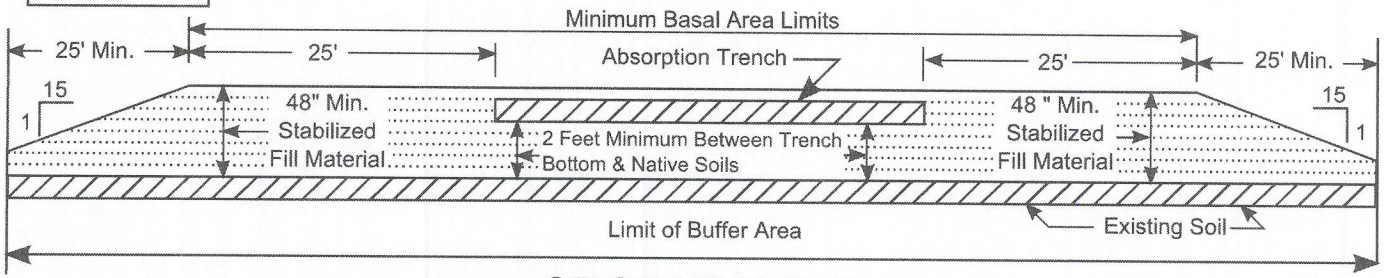


FIGURE 38: SITE MODIFICATION FOR LIMITED SURFICIAL USEABLE SOIL - TOP VIEW



SECTION A-A

(Not to scale)



SECTION B-B

(Not to scale)

NOTE: FOR LEVEL SITES THE ABSORPTION TRENCHES WILL BE SURROUNDED BY 25 FEET OF FILL MATERIAL (Basal Area) AND THE 75 FOOT TAPER WILL SURROUND THE BASAL AREA.

NOTES:

Sites with only six (6) inches of in situ usable soil and slopes not exceeding 15% may be modified to accomodate a conventional absorption trench system provided all of the following are met:

1. Laterals shall be placed 6 feet o.c.
2. The depth of useable soil (i.e., in situ plus fill) is at least 4 feet for the proposed absorption system.
3. A 12 inch depth of useable soil (i.e., in situ plus fill) shall extend 100 feet in the expected direction of the flow from the proposed absorption systems,25 feet parallel to contours, and 20 feet upslope for slopes of one to 15 percent. 110 feet radially is needed for slopes < one percent.
4. System shall not be built on sites with seasonal high groundwater unless the owner can demonstrate improvements that will divert groundwater from system and prevent any saturation of the fill material.
5. System shall not be constructed on parcels where there is less than 6 inches of naturally occurring soils from original grade to solid bedrock. System shall not be constructed on parcels where fractured bedrock exists at grade or within 2 feet of original grade.
6. A system shall not be built in unstabilized fill material. The fill material shall be allowed to settle naturally for a period of at least six months to include one freeze-thaw cycle, or may be stabilized by mechanical compaction in shallow lifts if a fill material consisting of only granular sand or sandy loam is used.
7. Deep hole and percolation tests are conducted on the stabilized fill during the normal high ground water period since mottling is not applicable to recently filled sites. The results must be satisfactory for the site to be used for wastewater treatment.
8. Trench construction shall meet Appendix 75-A requirements.
9. General construction practices, setback requirements, hydraulic loading, etc. shall meet the requirements set forth in Appendix 75-A.

FIGURE 38A: SITE MODIFICATION FOR LIMITED SURFICIAL USEABLE SOIL - SIDE VIEW

9.6 Site Modification to Accommodate Onsite Wastewater Treatment Systems

Sometimes site conditions such as insufficient useable soil, high water table or excessive slope exist that do not allow for proper siting of an OWTS in accordance with Appendix 75-A standards. In some cases sites can be "modified" using fill material and/or construction techniques to create site conditions that allow for proper wastewater treatment and dispersal. Contact the local health department or other local authority having jurisdiction before considering any of the following site modification options. Modification of a site without first contacting the local jurisdictional office is at the owner's risk and does not assure site approval.

9.6.1 Clay Barrier Protecting Bedrock Recharge Aquifers

Absorption systems should not be constructed directly over visible bedrock, cracks, crevices, depressions, sinkholes or other susceptible geologic formations to protect the aquifer. In very rare cases, an alternative method of protecting bedrock aquifers comprises installation of a six (6) inch clay barrier installed on the in situ soil/rock beneath the proposed absorption area and extending radially as described as follows. On slopes of less than 1%, the clay layer covered with at least one (1) foot of useable soil (1 to 60 minutes/inch) should extend 100 feet radially from the toe of the absorption area including the projected expansion area. On slopes of one to 15%, the clay layer covered with at least one foot of useable soil should extend radially from the toe of the absorption area including the projected expansion area 100 feet in the downslope direction, 25 feet parallel to contours, and 20 feet in the upslope direction. At least four (4) feet of useable soil should be installed above the clay layer in the proposed absorption area including the projected expansion area. Fill slopes shall not exceed one (1) vertical to three (3) horizontal. A design professional should supervise the above-noted system construction and certify that construction was in accord with approved plans.

9.6.2 Limited Surficial Useable Soil

A site modification option for sites with only six (6) inches of in-situ useable soil and slopes not exceeding 15% may be modified to accommodate a conventional absorption trench system. This site modification, involves the placement of an extensive amount of stabilized fill material with a percolation rate of between 5 and 30 minutes per inch on the site. Once the fill material is stabilized, a conventional absorption trench system is constructed in the fill. The aerial and depth limits of fill are such to provide a filled area of four (4) feet in depth above vertical boundary conditions and extending 100 feet down slope in the direction of flow (site contours). This creates a site condition where effluent must travel vertically through at least two (2) feet of useable soil and horizontally through at least 100 feet of useable soil to ensure adequate filtration and treatment. Other systems allowed on similar site conditions (intermittent sand filters and mounds) provide an added level of protection using smaller absorption areas because they utilize specified sand and pressure distribution to enhance wastewater treatment prior to distribution to in-situ soils.

The depth of useable soil (in-situ soil plus fill material) shall be at least 4-feet for the proposed absorption system and the reserve area. A 12-inch depth of useable soil shall extend 100 feet in the direction of wastewater dispersal from the absorption system and reserve area. Fill material tapers shall extend 25 feet parallel to contours and 20 feet upslope for sites with slopes of 1 to 15 %. For flat sites with slope of less than one 1%, the fill material shall extend 100 feet radially around the absorption area. A site modification using fill material is depicted in **Figures 38 and 38A**.

A system shall not be built on sites with seasonal high groundwater unless the owner can demonstrate improvements that will divert groundwater from system and prevent any saturation of the fill material. A system shall not be constructed on parcels where there are less than six (6) inches of naturally occurring soils from original grade to solid bedrock. System shall not be constructed on parcels where fractured bedrock exists at grade or within two (2) feet of original grade.

A system shall not be built in unstabilized fill material. Deep hole and percolation tests must be conducted in the stabilized fill during the normal high ground water period since mottling is not applicable to recently filled sites. A conventional trench design shall be designed based upon the stabilized fill material percolation rate.

9.6.3 Very Fast Percolating Soils

Soils with very fast soil percolation rates (i.e., less than one (1) minute per inch) are not suitable for conventional absorption systems. Very fast percolation rate soils do not provide adequate treatment of wastewater because the effluent moves too quickly through the soil and may reach ground water before being fully treated. Where soils exhibit a percolation rate faster than one (1) minute per inch and all horizontal and vertical boundary conditions are met, the site may be modified via a special cut and fill system. All soil bounded by two (2) feet from the proposed absorption trenches (i.e., horizontally and vertically) shall be removed and replaced by a known soil type or the in-situ soil can be blended with a slower percolating soil to slow down the soil percolation around and below the absorption area.

Imported or blended soil with a percolation rate of five (5) to sixty (60) minutes per inch can be used; however, a soil with percolation rate of five (5) to ten (10) minutes per inch is preferred. Stabilization by mechanical compaction can be performed if the imported or blended material consists of only granular sand or sandy loam. Soil should be replaced in six (6) inch layers with mechanical compaction to the approximate density of the on-site soil. Care must be taken to not overly compact the soils. Additional percolation tests may be performed on each soil layer as they are being compacted. Oversight by the design professional during this process is suggested. Other soil types should be stabilized by natural settlement for a period of at least six (6) months, including a freeze-thaw cycle. Percolation tests of the replacement soil or stabilized blended soil coupled with proposed daily flow rates shall be used to select the total lineal footage of distribution pipe needed. Conventional absorption trenches shall be constructed in the replaced soil. The vertical and horizontal separation distances noted in **Figures 1, Figure 17 and Table 2** shall also be met. Replacing soil with imported granular sand or sandy loam soil with a percolation rate of five (5) to ten (10) minutes per inch range is the preferred method of soil replacement over soil blending. It is difficult to properly blend soils (cement mixer or backhoe), particularly soils with some clay or silt content. A site modification for very fast soils is depicted in **Figure 37**.

9.6.4 Sloping Sites

Appendix 75-A states that "Slopes greater than 15% are … unacceptable." Therefore, any site that will be developed with a slope greater than 15% will require the granting of a specific waiver or other approval by the LHD. Consequently, before installation on sites with slopes greater than 15% begins (which may include site modification), the LHD or local authority having jurisdiction should be contacted to determine if the proposal is acceptable or if plans/permits are needed. Sites with existing slopes exceeding 20% should not normally be considered for residential OWTSs; however, development following mining represents one exception (conversion of hillsides, eskers. etc., to relatively level sites). The 15% slope limitation established in Appendix 75-A for construction of subsurface treatment